

Calibration

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Calibration

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Overview

System alignment procedures should be performed each time you replace a major system component. When possible, run these tests in the same sequence that they appear in this section.

Table

There are two table calibration procedures: the Table Motion Calibration and the Table Position/Display Adjustments. The Table Motion Calibration is performed to set hardware and software stops for each table motion. The Table Position/Display Adjustment should be performed to adjust the elevation and tilt position indications on the Vacuum Fluorescent Display (VFD) if a table calibration was performed due to a recessed floor or the level (tilt) position was offset at a physician's request. All measurements are in centimeters

Table Motion Calibration

The Table Motion Calibration is used to set hardware and software stops for table motion. Hardware and software stops need to be reset during initial system installation if limited space requires a specific motion to be restricted. For instance, a low ceiling may require the hardware and software stop for vertical motion to be reset from the default factory setting. In addition, calibration should be performed whenever table hardware such as motors, limit switches or potentiometers has been replaced.

Setup

1. Remove the Tower's Top Cover to access the service switch and RS-232 port. Refer to the Replacement section if necessary.
2. Connect the RS-232 serial cable (female to male) between the serial port on your laptop and the 9-pin sub D serial port located near the service switch.
3. Start the Utility Suite on your laptop.
4. Click on the Tools pull-down menu and select *URO Service Tool* to launch the software application.

Calibration

5. When the disclaimer window is displayed click on the *I Agree* button.
6. When the COM Port window appears, configure the COM Parameters as shown in the table:

COM Parameter	Value/Setting
Baud Rate	19200
Handshake	XON/XOFF
Parity	No
Data	8
Stop	1
COM Port	COM 1

7. Click the *Ok* button.
8. When the *Ok Now?* window displays, click the *Yes* button.
9. On the *Save Configuration File?* window, click *No*.
10. When the Service & Installation Tool Window appears click on the *Parameter* button.



UROMAT 3000 Service & Installation Tool Window

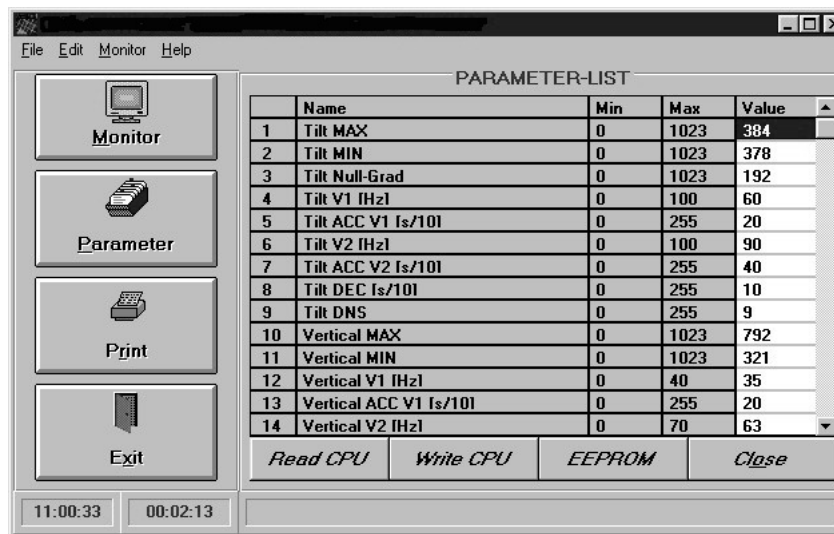
11. When the Open window appears select the *.hpo file from the subdirectory listing.

*Note: If you have previously worked on this system and stored a calibration file on your hard-drive. Find the subdirectory for this system and locate the *.hpp file. When the edited data is saved, it is saved as a *.hpp file. The *.hpo file contains default calibration data.*

12. Click Ok.

13. When the *Firmware Information Window* appears, click OK and then the *Parameter List* window will appear,

CAUTION: *Use care when changing values in the Parameter List. Incorrect values may cause the table to malfunction.*



Parameter List Window

14. Flip the Service switch to the *Service* position. The LED should stop blinking.
15. Click on the *Read CPU* button to load the established parameters from the table into the Parameter List window.
16. If the transfer was successful click *Ok*. If a Timeout Error message is displayed, check the serial cable connection and Service Switch status.
17. When the Firmware Information window displays, click on *Ok*.

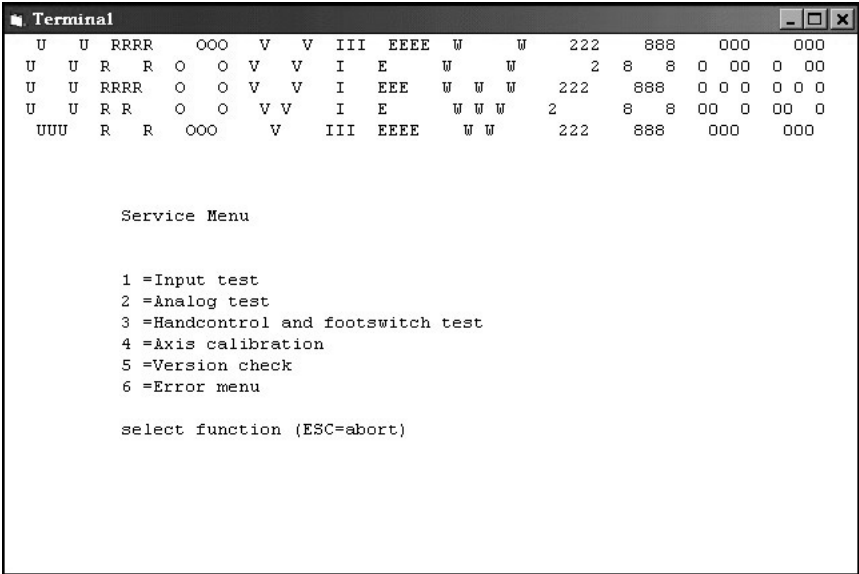
Note: Items 1, 2, 3, 10, and 11 in the Parameter list must each have a value between 25 and 1000. If you attempt axis calibration with any of these position pots out of range, the table calibration software resets. To calibrate any out-of-range pot, click the Monitor button and select Analog test from the Service Menu. Adjust the offending pot until it is within range. Then perform the axis calibrations.

Calibration

Note: If you receive a "Motion Blocked" error message during any of the axis calibrations and there is no obvious cause, check the related position pot to make sure it is still properly mounted to its tracking rail. If necessary, remount the pot and re-calibrate its range using the Analog test.

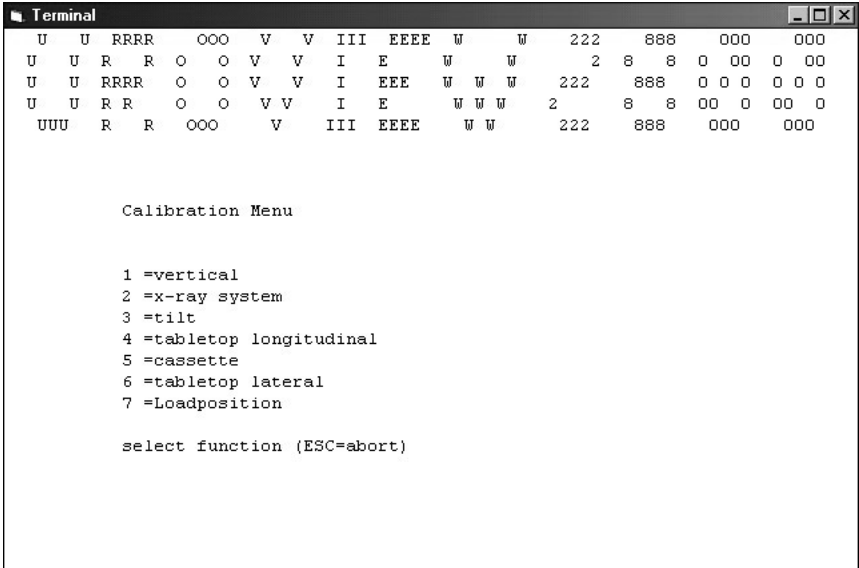
- 18. Click on the Monitor button.
- 19. The Service Menu window will display.

Note: Refer to the Diagnostic section for information regarding tests other than Axis Calibration.



Service Menu Window

- 20. Select Axis Calibration by pressing 4 on your laptop with the Service Menu Window displayed.
- 21. The Calibration Menu will display.

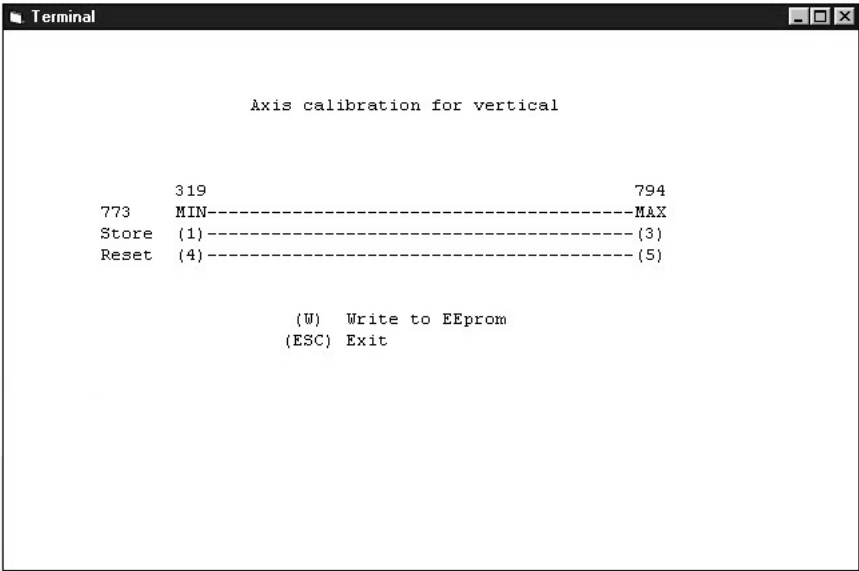


Axis Calibration Window

Vertical (Elevation) Axis Calibration

- 1. With the Calibration Menu displayed, select the vertical motion axis by pressing 1 on your laptop keyboard.
- 2. The Axis calibration for vertical window will appear.

Note: Pressing Reset (4), or (5), resets the A/D units to their min and max values, respectively.



Axis Calibration for Vertical Window

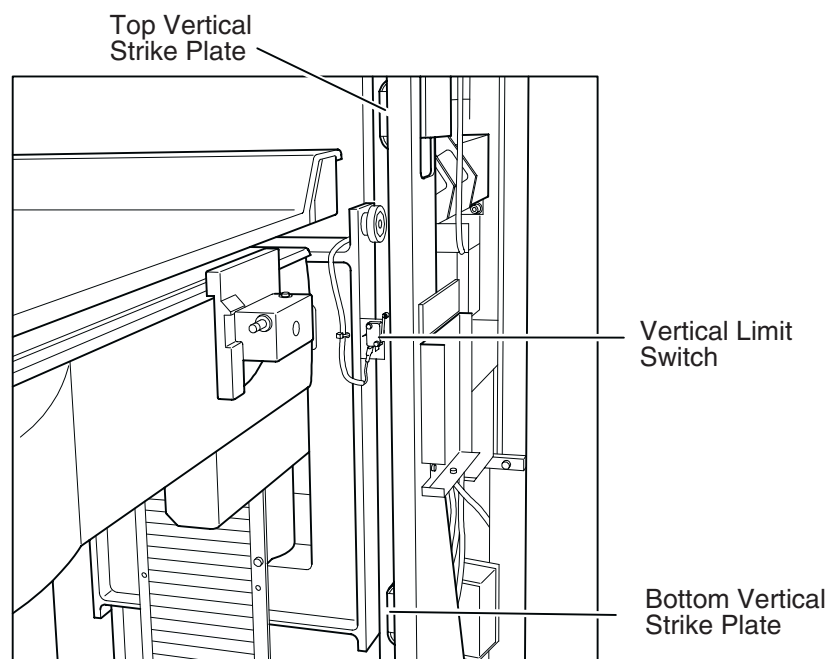
- 3. Use the hand control to place the table in the 0 degree (level) Tilt position.

Calibration

4. Use the hand control to raise the table to the maximum (1225 ± 10 mm) position if the ceiling height allows. Measure from the foot-end of the carbon fiber table-top to the floor.
5. When the software limit is set, the top switch strike plate can be adjusted so that the limit switch actuates approximately 2 - 5 mm afterwards.

Note: If it is necessary to restrict the height due to a low ceiling adjust the top switch strike plate downward until it prevents the table from striking the ceiling. Set the software limit to actuate 2 – 5 mm before the limit switch engages the strike plate.

6. Press 3 on your laptop to store the maximum value.



Vertical Axis Calibration

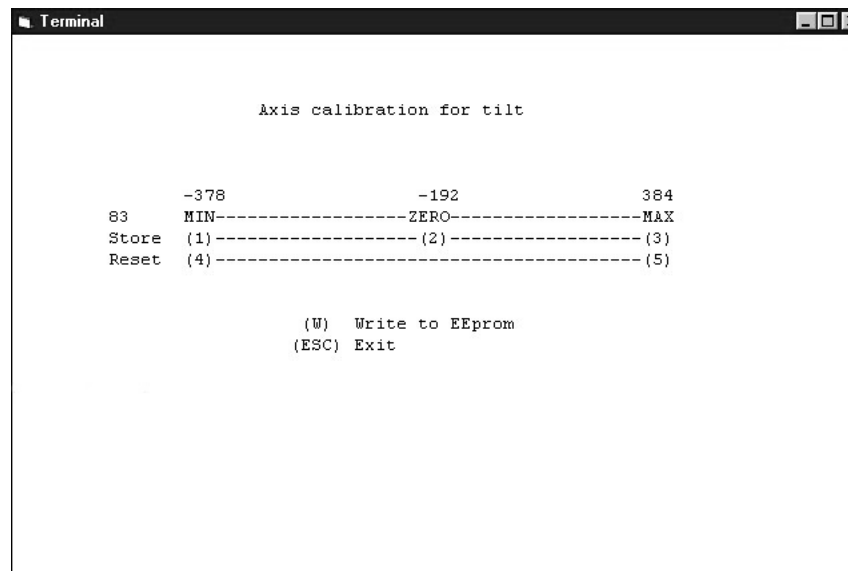
Calibration

7. If the X-ray Arm Assembly is close to the ceiling, verify that the housing does not hit the ceiling when tilted in either direction.
8. Lower the table and verify that the carbon fiber table-top is centered longitudinally.
9. Tilt the table to +88 degrees and then completely, lower the table to the minimum position (335 mm $\pm$ 10 mm) as measured from the foot end of the carbon fiber table-top to the floor.
10. When the software limit is set, the bottom switch strike plate can be adjusted so that the limit switch actuates approximately 2 - 5 mm behind the minimum height.
11. Press 1 on your laptop to store the value.
12. Press W to write the stored MIN and MAX values to the EEPROM and press ESC to exit.

Tilt Axis Calibration

1. With the Calibration Menu displayed, select the Tilt motion axis by pressing 3 on your laptop keyboard.
2. The Axis Calibration for Tilt window will appear.

Note: Pressing Reset (4), or (5), resets the A/D units to their min and max values, respectively.



```
Terminal

Axis calibration for tilt

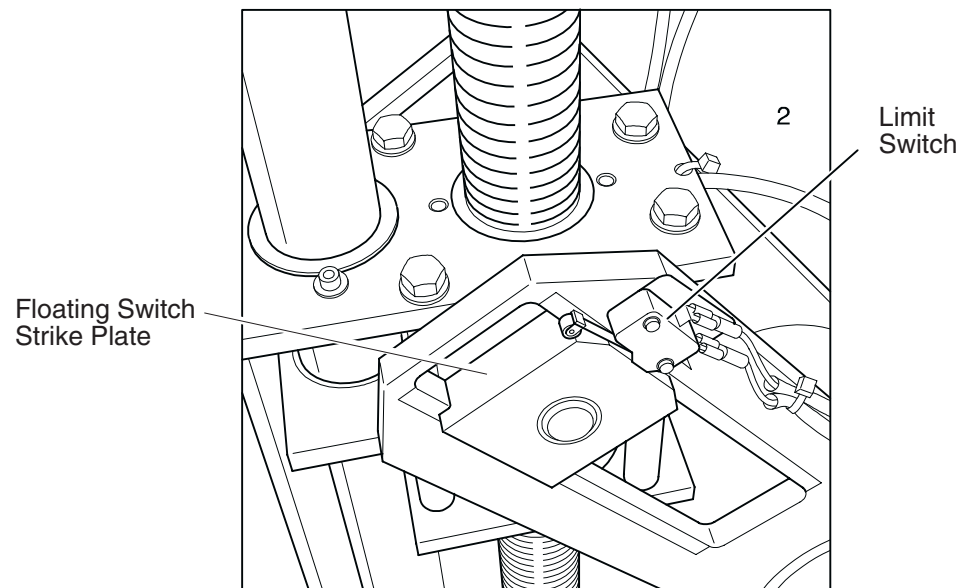
      -378                -192                384
83    MIN-----ZERO-----MAX
Store (1)----- (2) ----- (3)
Reset (4)----- (5) -----

      (W) Write to EEprom
      (ESC) Exit
```

Axis Calibration for Tilt Window

Calibration

3. Tilt the table-top to the +88° end position.
4. The top switch is the limit switch and the floating switch (bronze) is the switch strike plate.
5. The floating switch should actuate the microswitch (not shown) approximately 2 mm after the end position.
6. Press 1 on your laptop to store the value.
7. Level the table and then press 2 on your laptop to set the ZERO position.



Floating Switch Actuation

8. Tilt the tabletop into the -20° end position.
9. The top switch is the limit switch and the floating switch (bronze) is the switch strike plate.
10. The floating switch Strike Plate should actuate the microswitch approximately 2 mm after the end position.

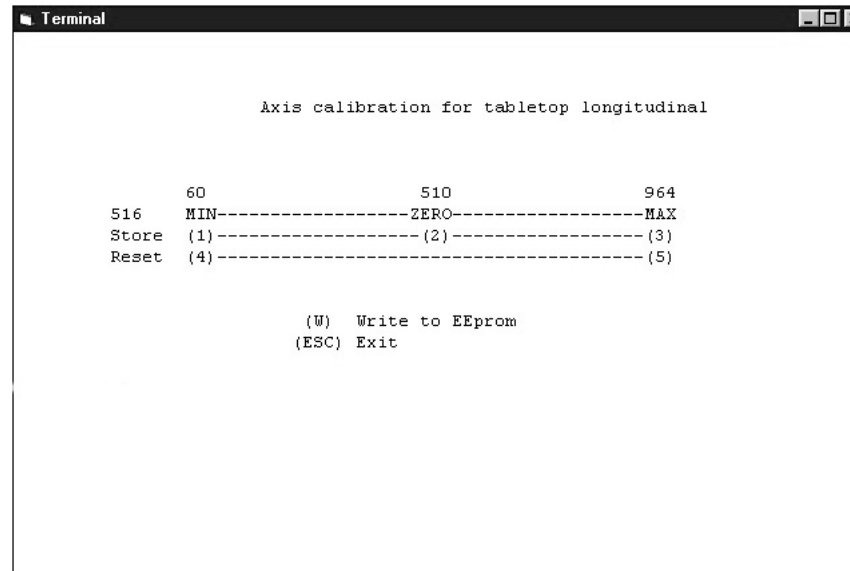
Calibration

11. Press 3 on your laptop to store the value.
12. Press W to write the stored MIN, ZERO and MAX values to the EEPROM.
13. Press ESC to exit.

Tabletop Longitudinal Axis Calibration

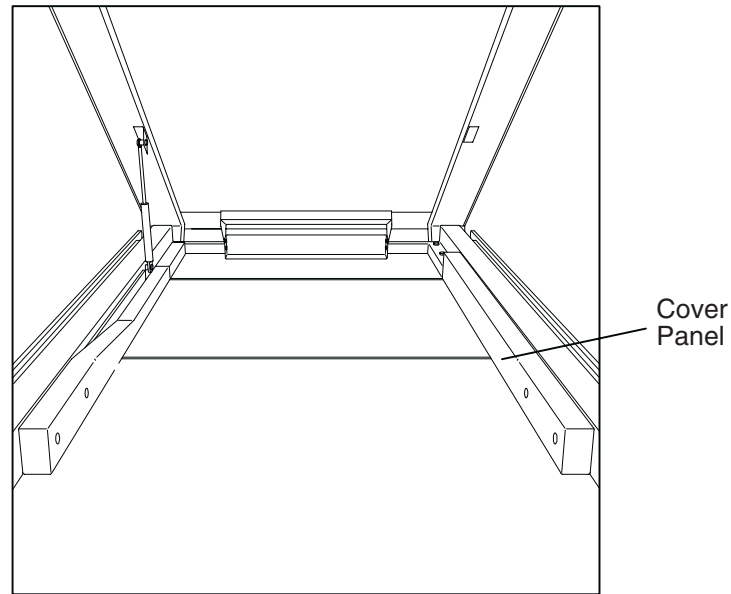
1. Place the table-top in the 0 degree (level) tilt position.
2. With the Calibration Menu displayed, select the Longitudinal motion axis by pressing 4 on your laptop keyboard.
3. The Axis Calibration for Tabletop Longitudinal window will appear.

Note: Pressing Reset (4), or (5), resets the A/D units to their min and max values, respectively.



Axis Calibration for Tabletop Longitudinal Window

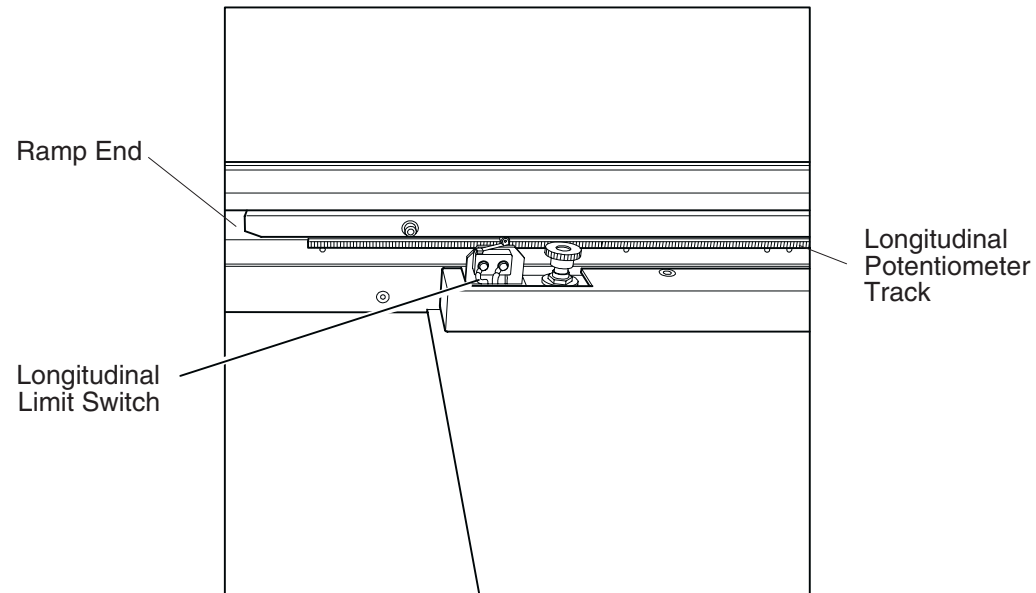
4. Lift up the tabletop (held in place by a gas spring) and remove the cover panel using a 2.5 mm allen wrench.
5. Set the software end positions to 240 ± 5 mm in each direction.



Remove Cover Panel

Note: When the table-top is centered, the black line on the plastic potentiometer gear will be pointing towards the tower.

6. Adjust the limit switch so that it switches off approximately 3 – 5 mm behind each end position. To do this, either the limit switch or the switch strike place can be adjusted.
7. Check the function over the entire movement path and reinstall the cover panel.



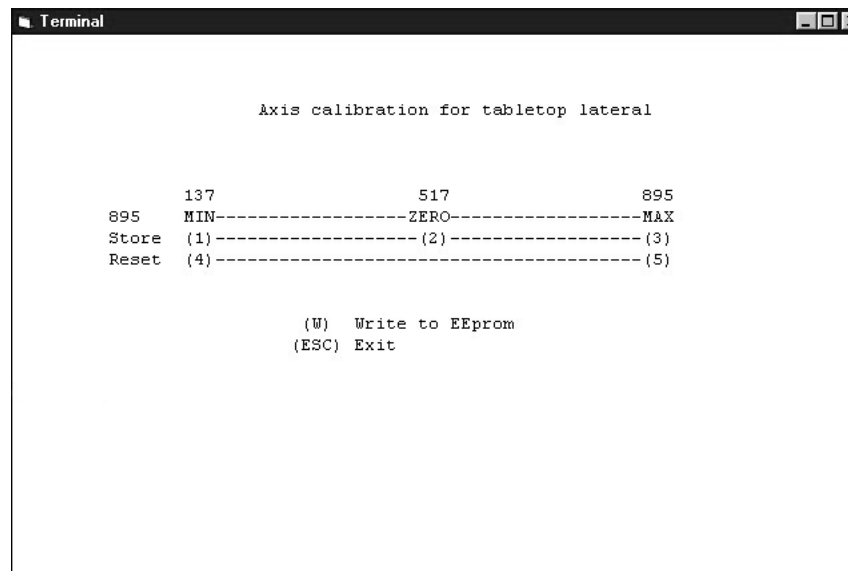
Adjust Longitudinal Limit Switch

8. Use the hand control to drive the table to the maximum longitude possible.
9. Press 3 on your laptop to store the value.
10. Use the hand control to drive the table to the minimum longitude possible.
11. Press 1 on your laptop to store the value.
12. Use the hand control to drive the table to the center (zero) longitude.
13. Press 2 on your laptop to store the value.
14. Press W to write the stored MIN, ZERO and MAX values to the EEPROM.
15. Press ESC to exit.

Tabletop Lateral Axis Calibration

1. With the Calibration Menu displayed, select the Lateral motion axis by pressing 6 on your laptop keyboard.
2. The Axis Calibration for Tabletop Lateral window will appear.

Note: Pressing Reset (4), or (5), resets the A/D units to their min and max values, respectively.



```
Terminal
Axis calibration for tabletop lateral

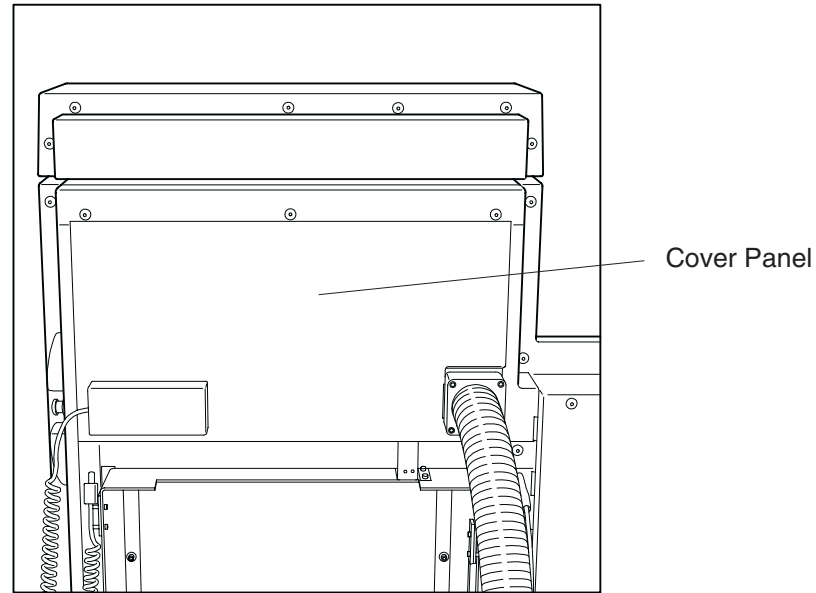
      137              517              895
895  MIN-----ZERO-----MAX
Store (1)----- (2) ----- (3)
Reset (4)----- (5) -----

      (W) Write to EEprom
      (ESC) Exit
```

Axis Calibration for Tabletop Lateral Window

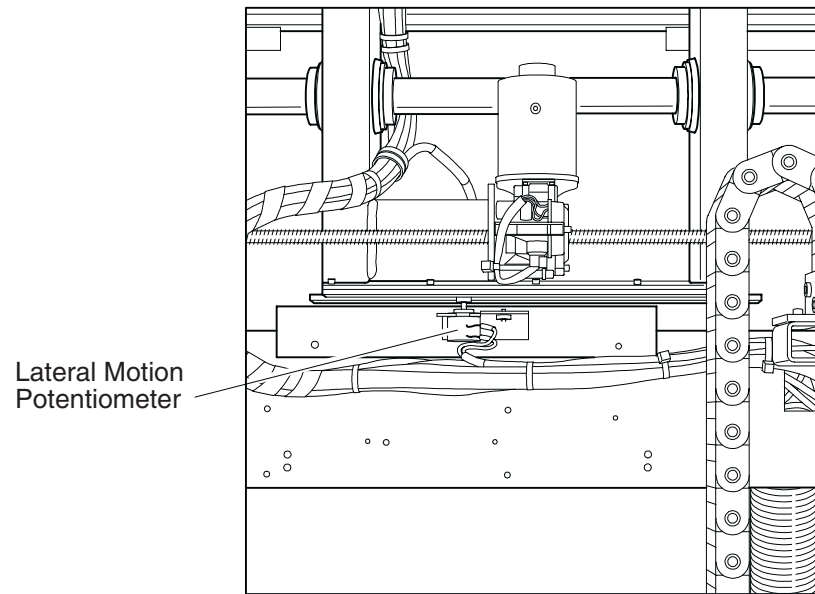
Calibration

3. Remove the cover panel.



Remove the Cover (bottom view)

4. Move the table-top laterally into the centered position.



Center and Set Lateral Motion

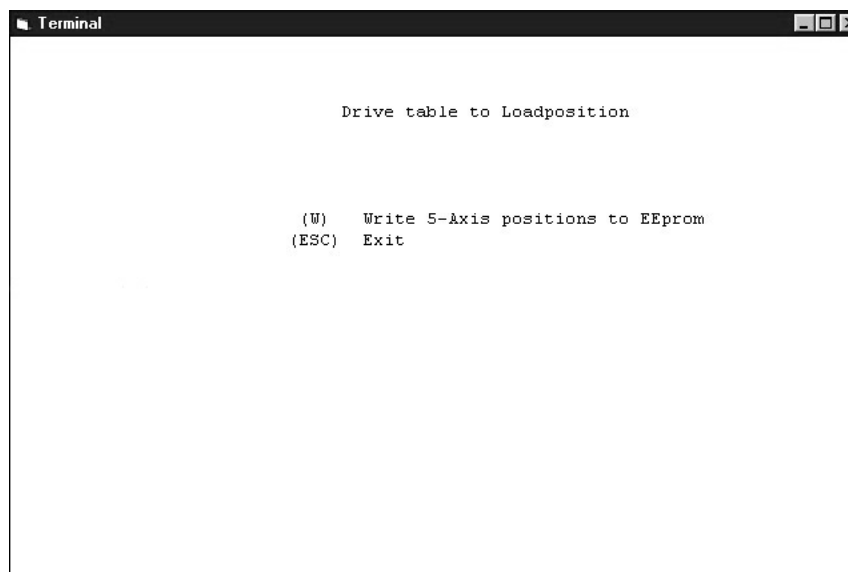
5. Lateral motion from center is ± 130 mm or 260 mm total distance.
6. Use the hand control to drive the table to the maximum lateral position possible.
7. Press 3 on your laptop to store the value.
8. Use the hand control to drive the table to the minimum lateral position possible.
9. Press 1 on your laptop to store the value.
10. Use the hand control to drive the table to the center (zero) lateral position.

Calibration

11. Press 2 on your laptop to store the value.
12. Press W to write the stored MIN, ZERO and MAX values to the EEPROM.
13. Press ESC to exit.

Loadposition Calibration

1. With the Calibration Menu displayed, select the Load-position by pressing 7 on your laptop keyboard.



Load Position Window

2. The Load-position window will appear.
3. Use the hand control to drive the table to the elevation, tilt and tabletop position that the Doctor wants to load patients.
4. Press W to write the values to the EEPROM.

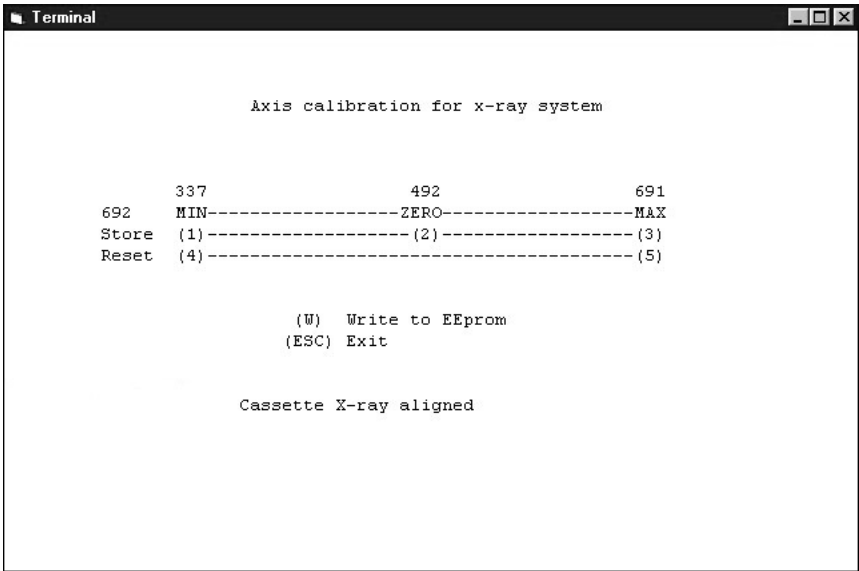
Calibration

- 5. Press ESC to exit.

X-ray Arm (System) and Cassette Axis Calibration

- 1. With the Calibration Menu displayed, select the Cassette Axis Calibration by pressing 5 on your laptop keyboard.
- 2. The Axis calibration for X-ray Arm will display.

Note: Pressing Reset (4), or (5), resets the A/D units to their min and max values, respectively.

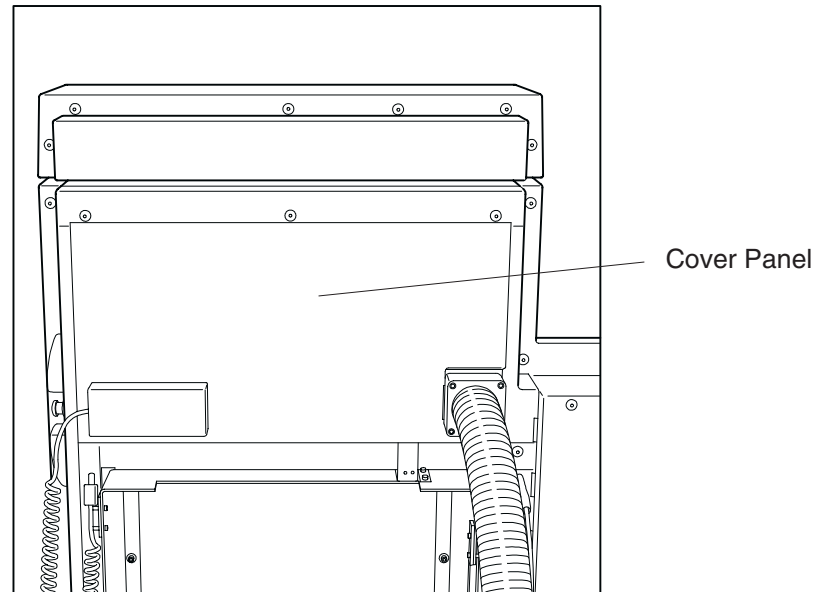


Axis Calibration for X-ray Arm Window

- 3. Move the table-top laterally away from the tower and remove the stainless steel cover located between the table and the tower

Calibration

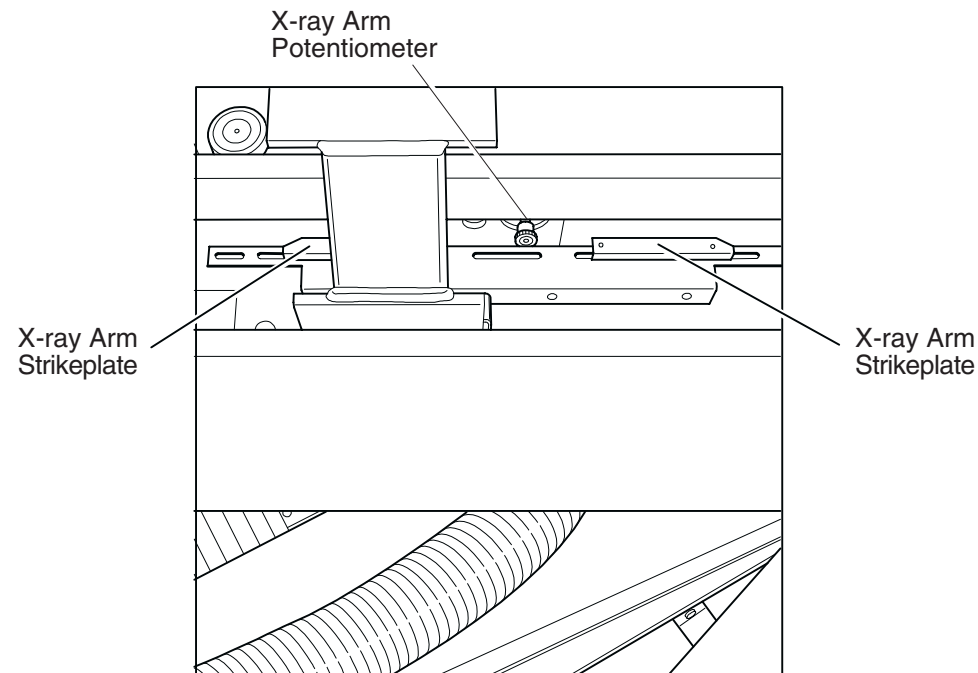
4. Remove the cover located directly underneath the previous cover.
5. Remove the splash-n-crash cover from the image intensifier.
6. Remove the cover panel from the bottom of the table if you have not already done so.



Remove the Cover Panel (Bottom View)

Calibration

7. Move the system carriage to the head end until there is 3 mm distance and adjust the switch strike plate so that it just actuates the S6 switch.
8. Press 3 on your laptop to store the value.
9. Move the system carriage to the foot end until there is 3 mm distance and adjust the switch strike plate so that it just actuates the S7 switch.

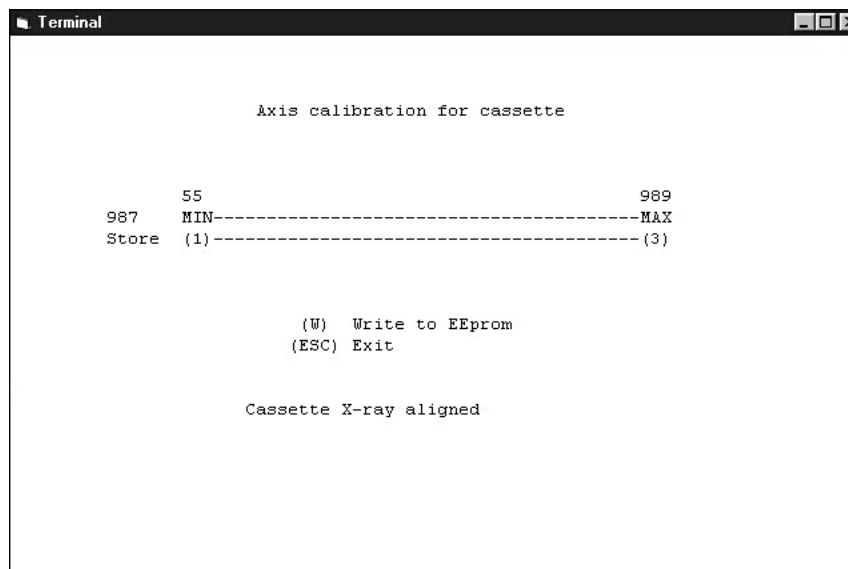


X-ray Arm Assembly

10. Press 1 on your laptop to store the value.
11. Press W to save the MIN and MAX calibrated positions.

Calibration

12. Press ESC.
13. With the Calibration Menu displayed, select the Cassette Calibration window by pressing 5 on your laptop keyboard.



Axis Calibration for Cassette Window

14. Press Memory 1 button on the hand control to move the cassette to MIN position.
15. Press 1 on your laptop keyboard to store the MIN position.
16. Press Memory 3 on hand control to move the cassette to MAX position.
17. Press 3 on your laptop keyboard to store the MAX position.
18. Press Memory 1 on the hand control again.
19. Press ESC to exit the Cassette Calibration window.
20. With the Calibration Menu displayed, select the X-ray Arm (System) again by pressing 2 on your laptop keyboard.

Calibration

21. Toggle the X-ray Arm Assembly button on the hand control until the message on the window changes from *Cassette X-ray not aligned* to *Cassette X-ray aligned*.
22. Press 2 on your laptop keyboard to store the centered (ZERO) position for the X-ray Arm (System).
23. Press W to save the value to the EEPROM.
24. Press ESC to exit the window and then Press Alt + F4 to exit the software.

Exiting Table Calibration

Perform this procedure, after performing a Table Motion Calibration, to exit Service Mode and backup calibration data to a file.

1. Place the Service Switch in the *Run* position.
2. Cycle the power by turning the Workstation power switch off and then on.
3. When the LED (LED next to Service Switch) starts blinking the system has completed booting. Place the Service Switch to the *Service* position.
4. From the Parameter List window, click the *Read CPU* button.
5. Click *OK* on the *Transfer Successful* window.
6. Click *OK* on *Firmware Information* window.
7. Click on the *File* pull-down menu and select *Save As*.
8. Enter a file name and save the calibration file to your laptop hard drive or floppy diskette.
9. Place the Service switch to the *Run* position prior to reinstalling covers.

Table Position/Display Adjustments

Perform these procedures to accurately display the elevation and tilt table position indications on the Vacuum Fluorescent Display (VFD) if a table calibration was required due to a recessed floor or physician's request for an offset tilt position. All measurements are in centimeters

Utility Suite Setup

1. Connect the Utility Suite cable to the laptop and the ARCNet port on the rear of the Workstation.
2. Start the Utility Suite software.
3. Click on the *VIEW* pull-down menu and select *RUT*.
4. Click on the *CONNECT* pull-down menu and select *SYSTEM*.
5. Click on the *FILE* pull-down menu and select: *OPEN, FROM SYSTEM, BOTH* to load the data from the UroView.
6. Select the Table Calibration form.

Elevation (Vertical) Position/Display

This procedure should be performed if the *Vertical MIN* parameter was changed during a Table Calibration to compensate for a recessed floor. This procedure adjusts the elevation parameters displayed on the Vacuum Fluorescent Display (VFD).

1. Perform the Utility Suite Setup.
2. Move the table to the +88 degree Tilt position.
3. Click the *Calibrate Elevation* button.
4. Move the table to the lowest elevation limit and then click the *Next* button.
5. Measure the distance, in centimeters, from the center of the table axle to the floor.

Calibration

6. Add the measured value to the constant¹ 22.8 cm and enter the result in the field.
7. Click the Finish button
8. Raise and level the table and then measure from the foot end of the table-top to the floor in centimeters and verify the distance measured is displayed on the VFD.
9. Click on the *FILE* pull-down menu and select: *SAVE, TO SYSTEM, BOTH* to save the calibration data.

Tilt Position/Display

This procedure should be performed if the Tilt Null-Grad parameter was changed (Delta2) during a Table Calibration to offset the zero tilt position at a physician's request. This procedure adjusts the tilt parameters displayed on the VFD.

1. Perform the Utility Suite Setup.
2. Click the *Calibrate Tilt Position* button.
3. Enter the null value (Delta) to correct the table tilt indication on the VFD.
4. Click the *Finish* button
5. Click on the *FILE* pull-down menu and select: *SAVE, TO SYSTEM, BOTH* to save the calibration data.

-
- 1 Constant is the distance from the center of the center of the table axle to the top of the table.
 - 2 Note the delta (difference) and offset the display by this amount.

Generator/Tube Filament Calibration

The generator/tube calibration is performed internally by the generator. Tube filaments age during the tube's life leading to mA inaccuracy. In order to obtain accurate mA, the mA accuracy is tracked during the tube's entire life. At the beginning of each exposure, the difference between the mA demand and the real mA is measured. The drift is recorded and used with a slow time constant to correct the filament drives initial values. During all the generator life, the software logs the drift on both focal spots in the generator saved RAM. You can access the saved data through the TNT Event Log. Refer to the *Diagnostic Section* for details about the TNT Event Log.

If the X-ray Tube, Filament, kV Control PCB or High Voltage Tank are replaced the aging parameters must be reestablished in the generator by completing a series of exposures. To establish new generator calibration parameters perform these steps:

1. Connect to the system using the Utility Suite.
2. Click on the Wrench Icon.
3. Click on the TNT Event Log form.
4. Click on the *Clear TNT Log* button.
5. Select manual technique, 80 kV @ 5 mA and take 5 consecutive 1 second exposures to establish a new log for the small filament.
6. Select Digital Spot mode, manual technique, 80 kV @ 5 mA and take 5 consecutive Digital Spot exposures to establish a new log for the large filament.

Entrance Exposure Rate Limits Verification

Setup

1. Install Collimator cover over the Collimator assembly.
2. Position the 15 cc Dosimeter Ion Chamber 30 cm above the Image Intensifier.
3. Measure the current atmospheric pressure in mm of mercury.
4. Measure the current room temperature in °C.
5. Enter the temperature and pressure into the Dosimeter (if applicable).
6. Connect the Utility Suite cable to the laptop and the ARCNet port on the rear of the Workstation.

mA Limit Editor

1. Start the Utility Suite software.
2. Click on the *VIEW* pull-down menu and select RUT.
3. Click on the *FILE* pull-down menu and select 2800.
4. Click on the *CONNECT* pull-down menu and select *SYSTEM*.
5. Click on the *FILE* pull-down menu and select: *OPEN, FROM SYSTEM, BOTH* to load the data from the UroView.
6. Select the *mA Limit Editor* from the directory tree.
7. When the *mA Limit File Editor* window appears, select Fluoro mode.
8. Select Manual Fluoro mode and Normal magnification. Select 40 kVp @ 10 mA. During a fluoro exposure, increase kVp until the Dosimeter reading is close to but not over the maximum corrected exposure rate of 9.26 R/minute. This is the breakpoint.

Calibration

9. Record the breakpoint at the corresponding kVp listing in the *mA Limit File Editor* window. For example, if you reached 9.26 R/minute at 85 kVp, enter 10 mA by 85kVp .
10. Increase kVp to the next setting that is evenly divisible by 5 (in this case, 90 kVp). Reduce mA until the entrance exposure rate does not exceed 9.26 R/minute. In the *mA Limit File Editor*, record the mA value by the corresponding kVp entry.
11. Repeat step 11, increasing kVp by five kVp each time, for the remaining kVp settings.
12. Once you have finished filling in mA values from the breakpoint, click *Interpolate*.
13. In the *mA Limit File Editor* window, change the mode from *Fluoro* to *HLF*.
14. Select Manual Fluoro mode and Normal magnification. Select 40 kVp @ 20 mA. During an HLF Fluoro exposure, increase kVp until the Dosimeter reading is close to but not over the maximum corrected exposure rate of 18 R/minute. This is the breakpoint.

Note: 18.0 R/minute is maximum exposure rate of 20 R/minute minus 10 % (5% for setup errors and 5% for dosimeter errors).

15. Record the breakpoint at the corresponding kVp listing in the *mA Limit File Editor* window. For example, if you reached 18.0 R/minute at 85 kVp, enter 10 mA by 85kVp .
16. Increase kVp to the next setting that is evenly divisible by 5 (in this case, 90 kVp). Reduce mA until the entrance exposure rate does not exceed 18.0 R/minute. In the *mA Limit File Editor*, record the safe mA value by the corresponding kVp entry.
17. Repeat step 18, increasing kVp by five kVp each time, for the remaining kVp settings.
18. Once you have finished filling in mA values from the breakpoint, click *Interpolate*.
19. Make a 125 kVp manual HLF exposure. Verify the reading is 18.0 $\pm$ 0.5 R/minute.
20. During a Fluoro exposure, increase kVp and verify that mA begins to decrease at the maximum corrected exposure rate.
21. Verify that the Dosimeter reading does not exceed the maximum corrected exposure rate of 9.26 R/minute throughout the kVp range.

Note: It may be necessary to use the *mA Limit File Editor* to readjust the mA values.

22. Click on the *FILE* pull-down menu and select: *SAVE, TO SYSTEM, BOTH* to save the calibration data.
23. Reboot the system and verify that it limits mA to the correct values for Fluoro and HLF.

Dose Area Product (DAP)

The following paragraphs explain how to use the Remote Utilities Tool to calculate the Dose Area Product (DAP). DAP is a calculation of surface dose at a given distance from the X-ray tube multiplied by the surface area receiving the dose. DAP is equal for all planes that are perpendicular to the beam axis.

Note: *DAP is a measurement of radiation from the X-ray tube, and does not represent the radiation being absorbed by the patient.*

1. Connect the cable from the Service Monitor to the VGA port on the Workstation's rear panel.
2. Connect the Service Monitor's AC power plug to the nearest AC receptacle and turn on the monitor.
3. Plug the service keyboard into the keyboard connector on the Workstation rear panel.
4. Start the system and allow it to boot completely.
5. Use serial cable (00-901559) to connect the serial port on the laptop to the ARCNet connector on the rear of the Workstation. Using your laptop open the Utility Suite.
6. Click on the *VIEW* pull-down menu and select RUT
7. Click on the *CONNECT* pull-down menu and select *SYSTEM*.
8. Click on the *FILE* pull-down menu, and select: *OPEN, FROM SYSTEM, BOTH*.
9. From the RUT main menu, click the *Dose Area Product Calibration form*. The Dose Area Product screen appears.
10. Place the Dosimeter's Ion Chamber on top of the table.
11. Open the collimator leaves completely, so that you cannot see the leaves when you take an X-ray.
12. Turn the Collimator Lamp on and center the ion chamber within the illuminated area.
13. Set the Dosimeter to read the dose rate in mR/s.
14. If necessary, enter the current temperature and barometric pressure into the Dosimeter.
15. Select Manual Fluoro mode and the NORM field.

Calibration

16. On the Service Keyboard, press Ctrl+Alt+M (all three keys at the same time).
17. On the Service Keyboard, press Ctrl+Alt+M (all three keys at the same time). Then press the x key on the Service Keyboard and verify on the Service Monitor that the leaves are 0 (+1/-10)% closed. Press the x key only one time.
18. Adjust the technique to 40 kVp @ 5 mA and take an exposure.
19. Allow the Dosimeter readings to stabilize for a few moments and then read the dose rate on the Dosimeter. Enter the dose rate and mA values into the corresponding Dose Rate and mA fields.
20. Set the kV and mA to each of the following techniques and take an X-ray. Read the Dosimeter for each X-ray shot and enter the dose rate and mA values into the Dose Rate and mA field that corresponds to the kV.
 - 50 kVp @ 5 mA
 - 60 kVp @ 4 mA
 - 80 kVp @ 3 mA
 - 100 kVp @ 2 mA
 - 125 kVp @ 2 mA
21. Once you have entered all six Dosimeter readings, click the *Calculate Coefficients* button. The system calculates the A, B, and C coefficients and displays each in its respective field.
22. Click on the *FILE* pull-down menu and select: *SAVE, TO SYSTEM, BOTH*.
23. Press the X key on the service keyboard to enable DAP if needed.

Collimator Calibration

Utility Suite Setup

1. Connect the Utility Suite cable to the laptop and the ARCNet port on the rear of the Workstation.
2. Start the Utility Suite software.
3. Click on the *VIEW* pull-down menu and select RUT.
4. Click on the *FILE* pull-down menu and select 2800.
5. Click on the *CONNECT* pull-down menu and select *SYSTEM*.
6. Click on the *FILE* pull-down menu and select: *OPEN, FROM SYSTEM, BOTH* to load the data from the UroView.
7. Select the *Collimator/Camera Setup* form.

Collimator Stops

This procedure calibrates the collimator leaves by closing the leaves, reading the position that corresponds to the potentiometer voltage, and then opening the leaves fully and reading the position again.

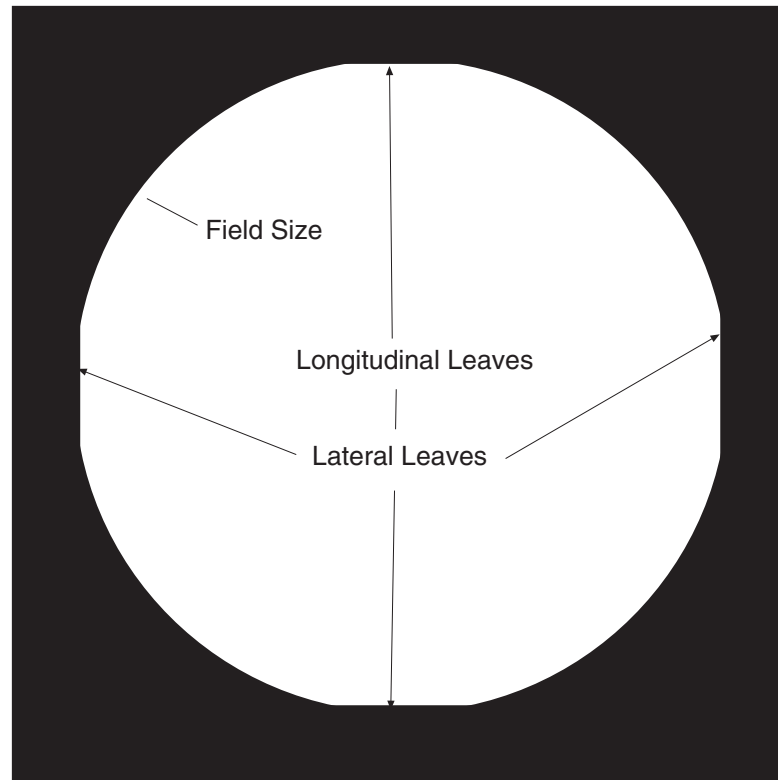
1. Perform the Utility Suite Setup procedure (this section).
2. Click on the Calibrate Stops button.
3. Verify that the leaves are closed and then opened and the software enters values for these positions in the lateral and longitude columns.

Collimator Field Size Calibration

1. Perform the Utility Suite Setup procedure (this section) and select the *Collimator/Camera Setup* form.
2. Select the MAG2 field size using the Control Panel.

Calibration

3. Click on the Calibrate MAG Mode button.
4. While taking an exposure, position the collimator's longitudinal and lateral leaves so they are just inside the MAG2 field. A slight flat spot may be seen.



Longitudinal/Lateral Leaves set slightly within Field Size

5. Click *Ok*.
6. Select *MAG1* mode on the control panel.

Calibration

7. While taking an exposure, position the collimator's longitudinal and lateral leaves so they are just inside the MAG1 field. A slight flat spot may be seen.
8. Click *Ok*.
9. Select NORM mode on the control panel.
10. Click the *Calibrate Normal Mode* button.
11. While taking an exposure, position the collimator's longitudinal and lateral leaves so they are just inside the NORM field. A slight flat spot may be seen.
12. Click *Ok*. Data should be visible in the MAG1, MAG2 and NORM / Longitudinal and Lateral fields

Collimator Calibration for Film/Nonfilm Systems

1. Perform the Utility Suite Setup procedure (this section).
2. Select the *Collimator/Camera Setup* form.
2. Click the Calibrate Film Size button.
3. Follow the on-line prompts to calibrate the collimator.

Note: Software detects whether the system is equipped with the Film feature and responds with the appropriate on-line prompts.

Saving data

1. Click on the *FILE* pull-down menu and select: *SAVE, TO SYSTEM, BOTH*.
2. Turn the system off, wait for about 10 seconds and then turn the system back on.

Video Standards Converter Setup

The Video Standards Converter (VSC) is standard on a UroView 2800 system. The VSC converts analog Hi-Res video (980 x 980) into standard SXGA analog video format (1280 x 1024). The VSC can also convert other optional video inputs into standard SXGA. Other optional inputs are:

- S-Video
- Computer Video (SVGA, XGA and SXGA)

Note: OEC Hi-Res video generally requires no adjustment. S-Video may require adjustment if the video source outputs non standard video. Computer Video modules require selection of the Video Mode.

The VSC is setup using the Utility Suite software and your laptop. Perform these steps:

1. Connect the Utility Suite cable to the laptop and the ARCNet port on the rear of the Workstation.
2. Start the Utility Suite software.
3. Click on the *VIEW* pull-down menu and select *RUT*.
4. Click on the *CONNECT* pull-down menu and select *SYSTEM*.
5. Click on the *FILE* pull-down menu and select: *OPEN, FROM SYSTEM, BOTH* to load the data from the UroView.
6. Select the *VSC Calibration* form.
7. Verify that the correct video modules are installed. If Computer Video Input is selected as an input, verify that the correct Video Mode is also selected (e.g. XGA 1024 x 768 x 75 Hz).
8. Click on the Video Module's corresponding Settings button.
9. Select the tab that has the desired adjustment. The available adjustments for each Video Module are listed in the following tables.
10. Move the slider control to make real-time adjustments on the Flat Panel Display.
11. Click on the *FILE* pull-down menu and select: *SAVE, TO SYSTEM, BOTH*.

Calibration

Note: If you receive an error message stating that the type of module configured does not match the type of module installed, select the correct module and resave the configuration.

OEC HI-RES SETTINGS (Single Channel)		
TAB	ADJUSTMENT	DEFINITION
Configuration	Channel Status	ON = Channel is enabled and will display as a video source when scrolling with the Video Shift button. OFF = Channel is disabled and will not display as a video source when scrolling with the Video Shift button. DETECT = Auto detect video presence
	Reset Channel	Reset channel to factory default values.
Reference	Black Level	The DC amplitude corresponding to black video.
	White Level	The DC amplitude corresponding to white video.
Clock Phase	Clock Phase	The signal that samples OEC Hi-Res input video at pixel rate.
Coefficient	N/A	N/A
Size Position	VCO Range	N/A
	Pixels/Line	N/A
	Horizontal Offset	Provides small horizontal image adjustment.
	Horizontal Image Size	N/A
	Vertical Offset	N/A
	Vertical Image Size	N/A

DUAL S-VIDEO (Dual Channel)		
TAB	ADJUSTMENT	DEFINITION
Configuration	Channel Status	ON = Channel is enabled and will display as a video source when scrolling with the Video Shift button. OFF = Channel is disabled and will not display as a video source when scrolling with the Video Shift button. DETECT = Auto detect video presence
	Reset Channel	Reset channel to factory default values.
Reference	Contrast	The range of difference between the lightest and darkest values of a picture, or maximum and minimum brightness values.
	Brightness	The maximum obtainable white level.
	Hue	The distinction between colors (e.g., red, yellow, blue, etc.). White, black, and gray tones are not considered hues.
	Saturation	The property of color that relates to the proportion of white light in the color. Highly saturated colors are vivid, while less saturated have more white and are therefore seen as pastel. For example, red is highly saturated while pink is the identical hue but much less saturated. Saturation is measured as the subcarrier amplitude in NTSC/PAL video.
Clock Phase	Clock Phase	N/A
Coefficients	N/A	N/A
Size Position	VCO Range	N/A

Calibration

DUAL S-VIDEO (Dual Channel)		
TAB	ADJUSTMENT	DEFINITION
	Pixels/Line	The number of pixels per line.
	Horizontal Offset	Defines where the video is displayed on the monitor.
	Horizontal Image Size	Defines the horizontal image size.
	Vertical Offset	Defines where the video is displayed on the monitor.
	Vertical Image Size	Defines the vertical image size.

Beam Alignment

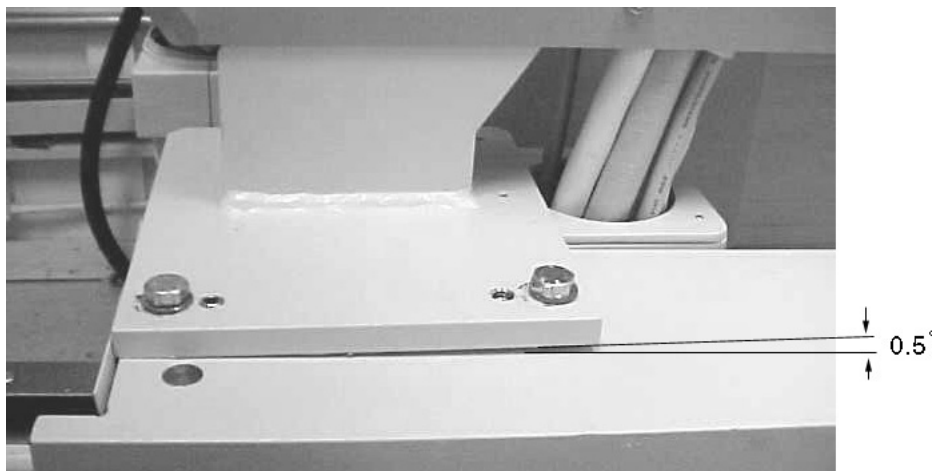
Perform this entire procedure when performing a beam alignment on systems with film capability. Omit the portions related to film when performing a beam alignment on systems without film.

Camera Preliminary Setup

1. Place a beam alignment template on the table top with the edge of the template squared to the foot of the table. Rotate the camera prism until the Fluoro image on the left hand monitor reflects the same orientation the doctor would see viewing the patient from the foot end of the table. This means that the head of the patient is at the top of the image and template tick marks are straight up and down.
2. Using a Wisconsin tool or equivalent, adjust camera focus. Note that this step is repeated after setting camera iris stop positions.
3. Check for dirt in the optics and, if necessary, clean before proceeding.

Table and Tube Leveling

1. If installed, remove the stainless steel cover located between the table top and the banana arm. A 2 mm hex key is required.
2. Using a bubble level or digital level placed on the table top near the point of X-ray perpendicularity, tilt the table until level (or near zero).
3. Visually inspect the mounting of the banana arm on the table. If the mounting flange shows a slight widening gap (approximately 0.5°) toward the foot end of the table, go to the Collimator Light Adjustment section. Otherwise, re-adjust the banana arm mounting flange to obtain the gap as follows:



- A. Loosen four socket head cap screws (5 mm hex key) on the back of the banana arm mounting flange and two bolts (13 mm socket) on top of the banana arm mounting flange. Unscrew two hex heads setscrews (4 mm hex key) on the top of the flange until the flange can sit perfectly level on the table plate. Adjust the hex head setscrews on top of the flange nearest the foot of the table until it just touches the mounting plate.
- B. With the six bolts loose, push the banana arm toward the head of the table while tightening the top flange screw nearest the foot of the table one full revolution.

Note: One full turn of this set screw rotates the banana arm approximately 0.5 degrees. Each degree of rotation translates the central x-ray approximately .750 inches). Let the banana arm settle back into position and verify the end of the flange nearest the foot of the table is slightly higher than the end nearest the head of the table.

- C. Tighten the six bolts holding the banana arm mounting flange to the table in the following sequential order:
 - a. Snug fastener 1
 - b. Snug fastener 2
 - c. Tighten fastener 1
 - f. Snug fastener 4
 - g. Snug fastener 5
 - h. Tighten fastener 4

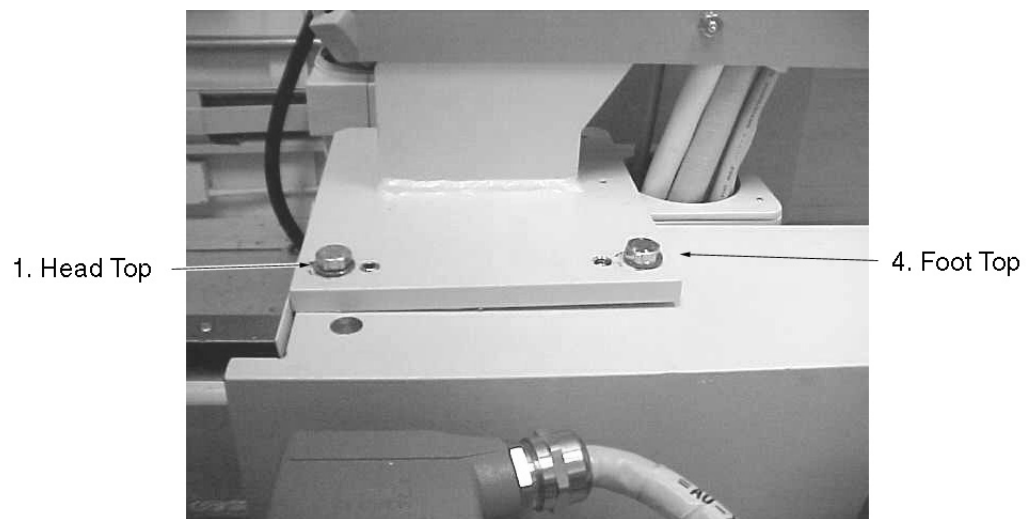
Calibration

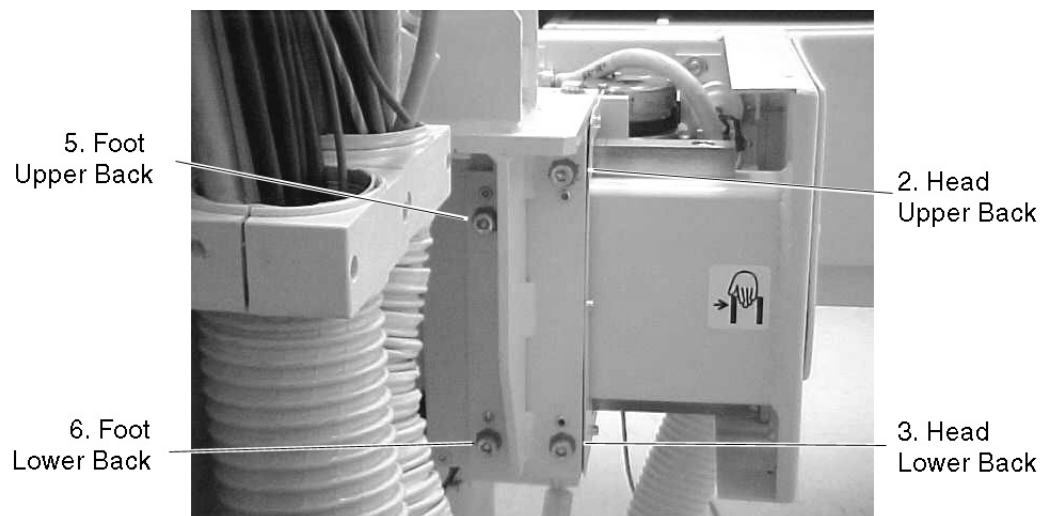
d. Tighten fastener 3

e. Tighten fastener 2

i. Tighten fastener 6

j. Tighten fastener 5



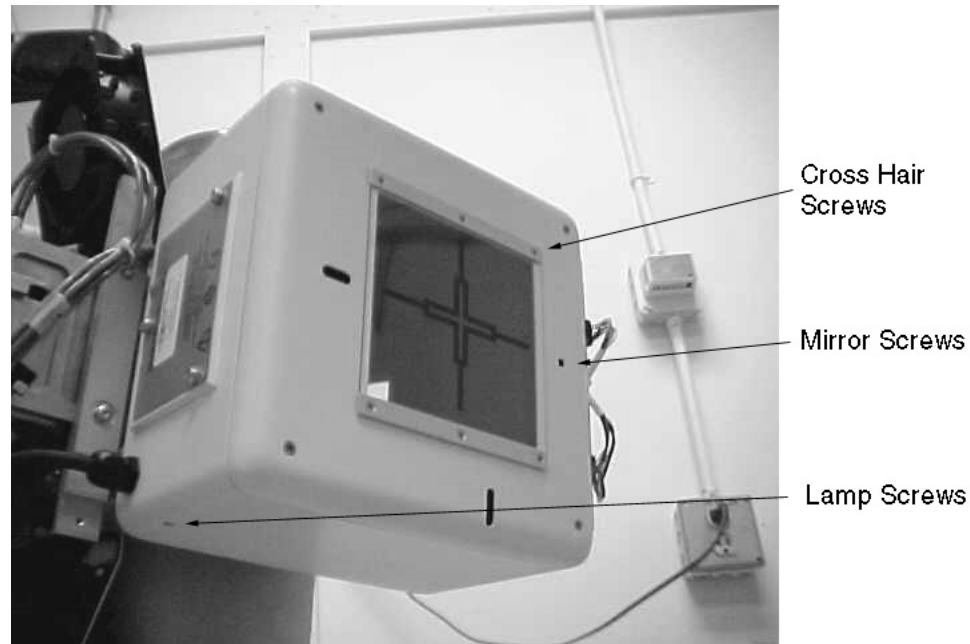


Note: A snug fit is when the fastener bottoms out without additional torque. The torque specification for tight is 8 +/- 1 foot-pounds. The angle of the banana front and back should be approximately 90 degrees (the same as the tower). If this is not the case, the back set screws must be adjusted to plumb the banana.

4. Upon completion, visually note a small widening gap on the mounting plate that widens toward the foot of the table.

Collimator Light Adjustment

1. Place the perpendicularity tool at the center of the alignment template on the table top (pad removed). Move the alignment template (or table top) such that the two balls on the perpendicularity tool are precisely aligned during a fluoro exposure.
2. Take a fluoro image and collimate down until all four leaves are just into the image. Using four screws or washers as markers, place a marker on the alignment template grid X and Y axis at each of four quadrants corresponding to the exact location in the X-ray image. Take another fluoro exposure. Verify each marker is exactly balanced on each axis. If not, reposition markers and verify alignment with another fluoro shot.



3. Using the collimator light. Adjust the mirror and lamp on the collimator so that the light is precisely centered on the markers in each axis (7/64 hex key).

Note: Turning on the collimator light makes it much easier to see the mirror and lamp adjustment screws. The mirror adjustment may require the removal of the face of the collimator housing cover unless a long hex key is used.)

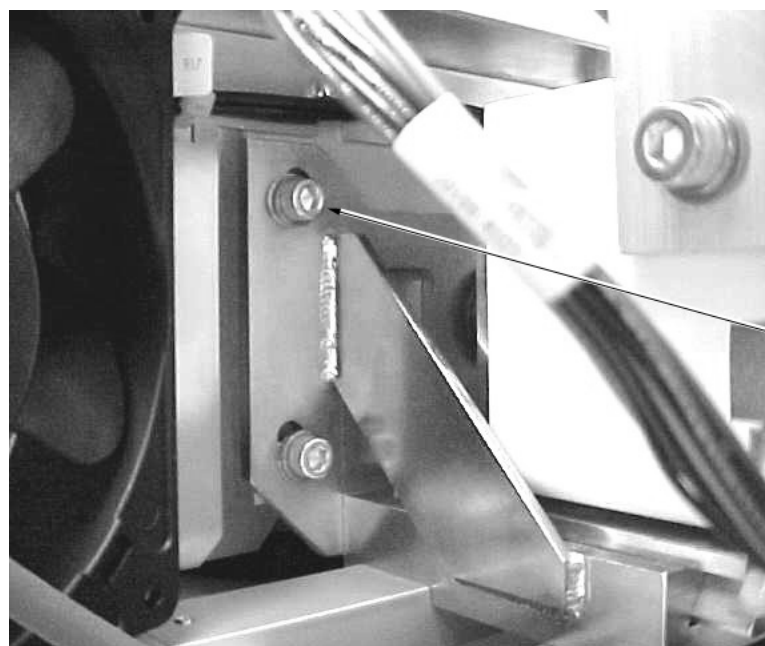
Fluoro Perpendicularity

Note: The following two steps must be performed with extreme precision. Although an alignment may be “close” in fluoro mode, the filmer has no lateral adjustment. Therefore, the film mode calibration may fail in later steps necessitating re-alignment of fluoro perpendicularity and fluoro beam position.

Calibration

To ensure proper film alignment, for the following two steps, the X-ray beam must be centered to the perpendicular point to within $\pm \frac{1}{2}$ tick mark on the alignment template in each axis. That is to say, in each axis, the difference in position of the collimator leaves can be no more 1 full tick mark of the alignment template.

1. Loosen the four bolts (5 mm hex key) near the cooling fans on the back of the X-ray tube. Tilt the tube such that both blades on the collimator are equidistant from the center of an X-ray exposure in the longitudinal direction. The light field may be used to aid in positioning but the fluoro exposure must be balanced. As adjustments are made, reposition the template as necessary to maintain precise perpendicularity.

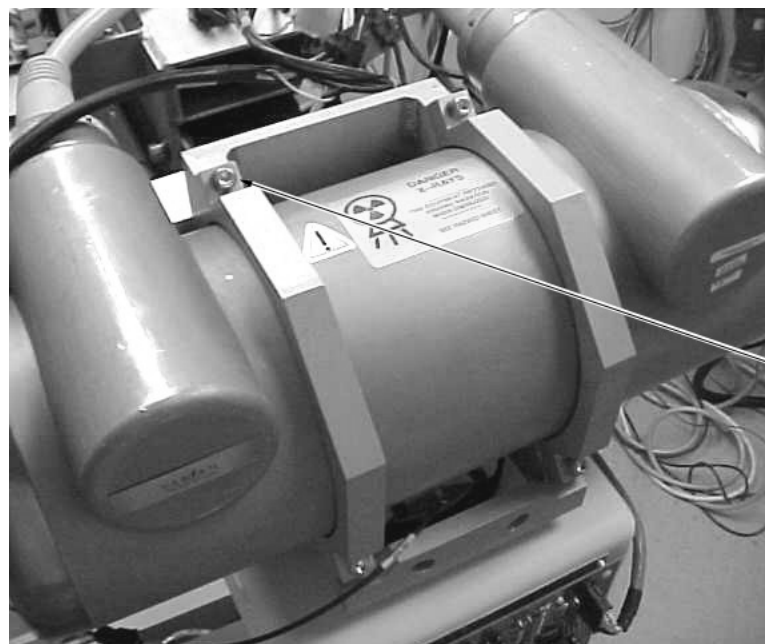


Longitudinal
Rotation
Screws

2. Tighten the four bolts. Verify alignment in the longitudinal axis to within $\pm \frac{1}{2}$ tick mark in the fluoro image.
3. Loosen the four trunion ring bolts (5 mm hex key) and rotate the tube such that both collimator blades are equidistant from the point of perpendicularity in the lateral direction during a fluoro exposure. As adjustments are made, reposition the template as necessary to maintain precise perpendicularity. When the desired position is reached, tighten trunion ring bolts

Calibration

in small increments (in a criss-cross fashion) to avoid rotating the tube while tightening. Re-verify beam position frequently while tightening bolts to help avoid total repositioning.



Lateral
Rotation
Screws

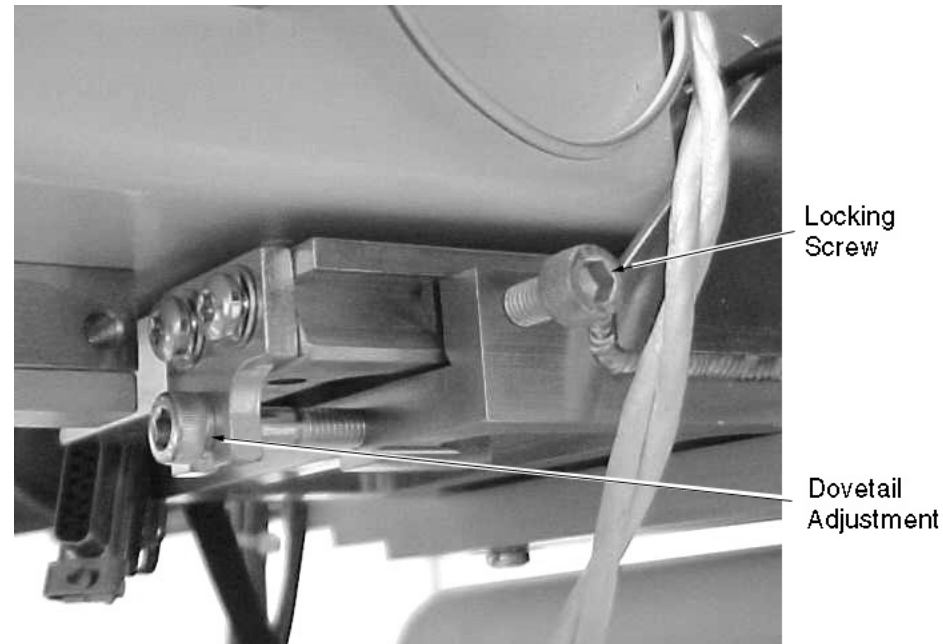
4. Verify alignment in the lateral axis to within $\pm \frac{1}{2}$ tick mark in the fluoro image.
5. Verify the X-ray beam is longitudinally aligned with the table top as follows. Place the X-ray system in MANUAL TECHNIQUE mode and close the lateral leaves just wide enough to see the tick marks in a fluoro image (top to bottom). Verify the template is square to the foot of the table and the X-ray beam is perpendicular to the foot of the table. If the X-ray beam does not precisely align with tick marks top to bottom, loosen the collimator mounting ring set screw and twist the collimator until straight. The collimator can only be assembled correctly by first tightening the collar (7/64 hex key) and then the set screw (1/8 inch hex key). The set screw has a detent that orients and locks the rotation. It also stiffens the assembly.

Collimator Optical Target Adjustment

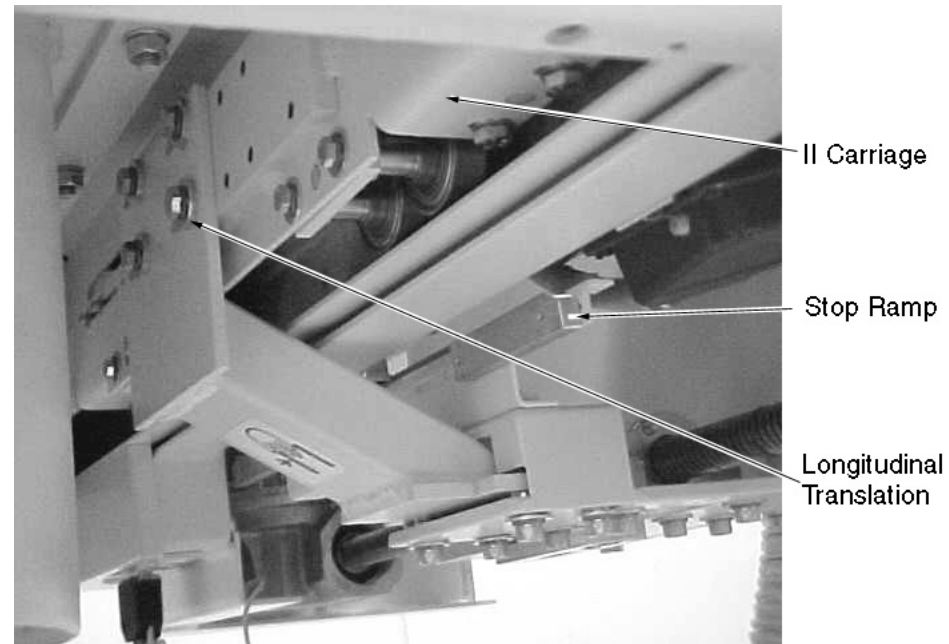
1. Turn on the collimator lamp. Verify the cross-hairs of the light align with tick marks on each axis of the template. If not, loosen six screws holding the cross hairs to the bottom of the collimator and adjust the cross hairs until aligned. Re-tighten six screws.

Fluoro Beam Alignment

1. Remove the perpendicularity and alignment tool from the table top.
2. Connect a RUT computer to the system. Perform a "Connect." Upload all RUT data from the system. Use "Save As" to save the file to disk in a temporary location.
3. Using RUT, hide the circular mask allowing edges of the Image Intensifier output port to be observed. If necessary, use RUT to adjust camera X-Y positioning to allow all edges to be seen. Adjust collimator leaves such that all four leaves can be seen in the image.
4. Loosen the X-ray tube dovetail locking bolt. Move the tube in or out such that the collimator leaves enter the image field equally on both sides of the image. Note that more precise centering is possible if the leaves are opened such that each leaf barely shows in the image.

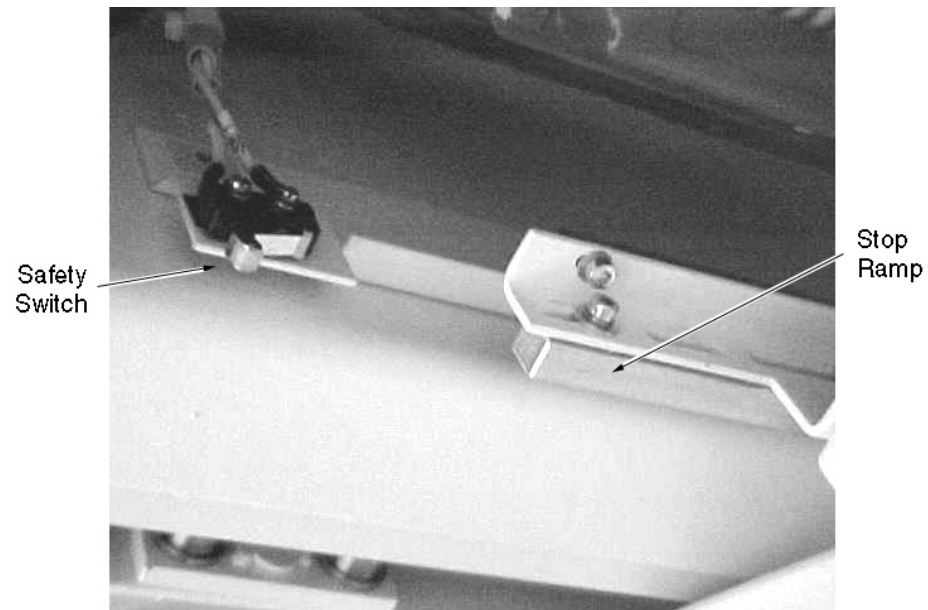


5. Tighten the dovetail locking bolt and verify the leaves are closely balanced during a fluoro shot in the lateral direction.
6. Loosen four bolts holding the Image Intensifier to the carriage bracket. With the circular mask hidden, move the Image Intensifier carriage until the collimator leaves enter the image field equally at the top and bottom of the image. Again, opening the leaves as alignment is achieved produces more precise centering.

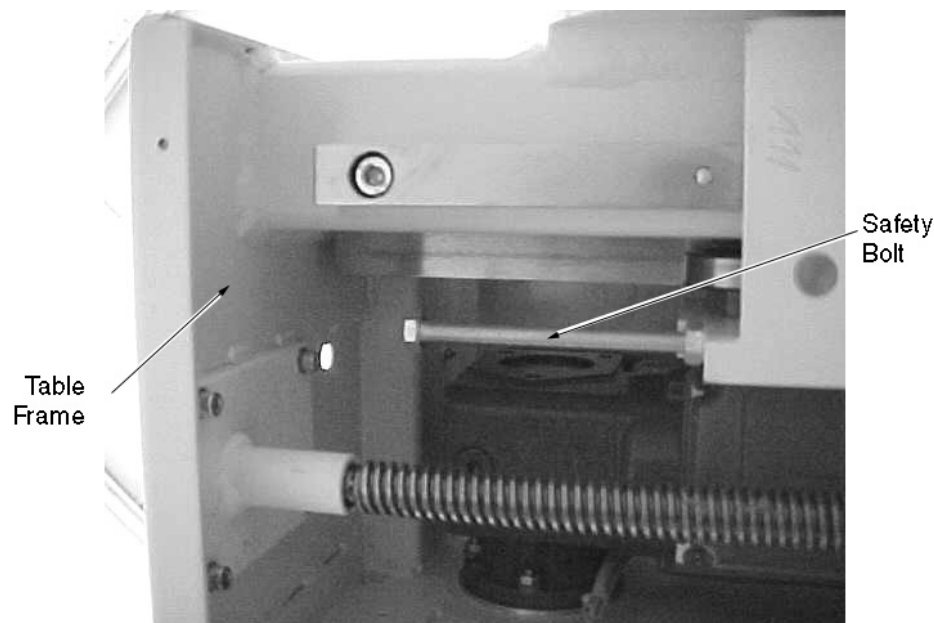


7. Tighten four bolts holding the Image Intensifier to the carriage bracket.

Note: Once the carriage has been moved, it may require additional adjustment of safety stops. These include the software calibration stops in the image chain alignment, a stop ramp and micro-switch, and a safety bolt. If these adjustments are not made, it may be possible to drive the carriage into the table and damage the image chain.



Once the software stops are set to allow the carriage to travel within 3 mm of the end of the table, the stop ramp should be checked to see that it is on the verge of actuating the micro-switch. If not, it should be adjusted to do so.



The safety bolt should have the same gap to the end of the table frame as the carriage has to the end of the table. This bolt should be adjusted so that if both software and the micro-switch fail, the bolt and the carriage will both contact the table frame at the same time. This insures that the image chain motor is equally loaded. If the software detects a stalled condition in the image chain motor, it will stop image chain motion.

Camera Electronic Centering

1. Using RUT, show the circular mask. Position collimator leaves such that both leaves are observed in both axis.
2. Using RUT, adjust camera X-Y positioning such that the amount of leaves seen in each axis are exactly balanced in the fluoro image. Again, for more precise alignment, adjust collimators leaves so that a minimum amount of leaf is seen in each axis.
3. After near-perfect balance is achieved in both axis, disable camera X-Y adjustments.

Calibrate Fluoro Collimator Leaf Position

Note: In the following procedure, be patient when selecting RUT buttons and changing magnification modes. Expect reduced software response times.

1. Using RUT, Collimator/Camera setup page, select the “Calibrate Stops” button. Wait for RUT to collimate from stop to stop in each axis.
2. Select the “Calibrate Mag Modes” button. After selecting the button, a “Select MAG 2” message is displayed. Use the X-ray Control Panel mag mode button to change to MAG 2. Remember that in this calibration mode, response to button presses and software messages is slow. Allow sufficient time.

RUT guides you through the rest of the procedure. Adjust collimator leaves so that they barely show in each edge of the image. The precision with which perpendicularity, beam alignment and electronic centering was achieved determines how well balanced the leaves are displayed in the image. Continue with the process until the leaves are calibrated in both MAG 1 and MAG 2.

3. Calibrate collimator leaves for NORMAL mag mode by selecting the “Calibrate Normal Mode” button.

Calibrate Film Collimator Leaf Position

1. Using RUT, Collimator/Camera setup page, check the box labeled “Show Film Edges.”
2. Using RUT, Collimator/Camera setup page, click the Calibrate Film button. Follow the on-line instructions. Enter all values in centimeters.

Save Collimator Calibration Values

1. Using RUT, save both generator and workstation configuration to the system. Reboot the system and verify proper positioning of collimator leaves in normal, MAG 1 and MAG 2 fluoro images. (Verification of film collimator calibration will be performed in later steps).
2. Reboot the system. Take a fluoro shot in each field size (mag mode) and verify all four leaves show in each image.

Calibrate Film Tray Longitudinal Position

1. Remove the Tower's Top Cover to access the service switch and RS-232 port. Refer to the Replacement section if necessary.
2. Connect the RS-232 serial cable (female to male) between the serial port on your laptop and the 9-pin sub D serial port located near the service switch.
3. Start the Utility Suite on your laptop.
4. Click on the Tools pull-down menu and select *URO Service Tool* to launch the software application.
5. When the disclaimer window is displayed click on the *I Agree* button.
6. When the COM Port window appears, configure the COM Parameters as shown in the table:

COM Parameter	Value/Setting
Baud Rate	19200
Handshake	XON/XOFF
Parity	No
Data	8
Stop	1
COM Port	COM 1

7. Click the *Ok* button.
8. When the *Ok Now?* window displays, click the *Yes* button.
9. On the *Save Configuration File?* window, click *No*.
10. When the UROMAT 3000 Service & Installation Tool screen appears click on the *Parameter* button.



UROMAT 3000 Service & Installation Tool

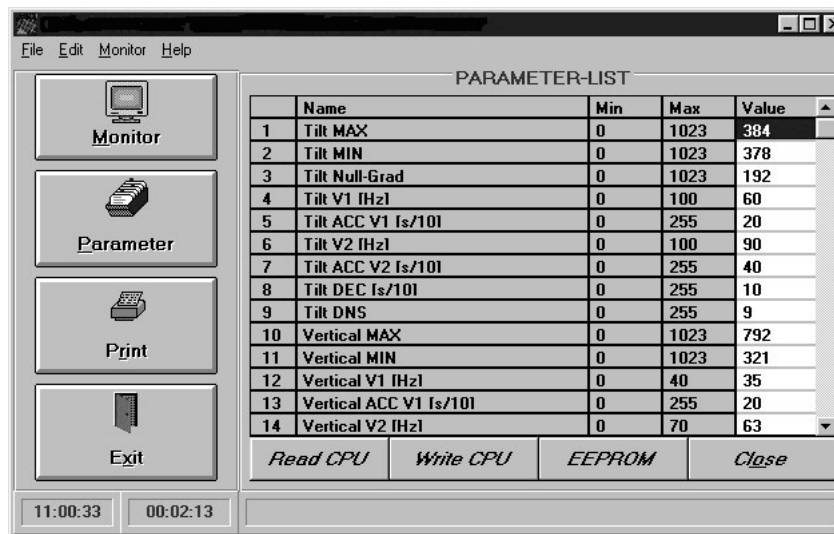
11. When the Open window appears select the *.hpo file from the subdirectory listing.

*Note: If you have previously worked on this system and stored a calibration file on your hard-drive. Find the subdirectory for this system and locate the *.hpp file. When the edited data is saved, it is saved as a *.hpp file. The *.hpo file contains default calibration data.*

12. Click Ok.

13. When the *Firmware Information Screen* appears, click OK and then the *Parameter List* window will appear,

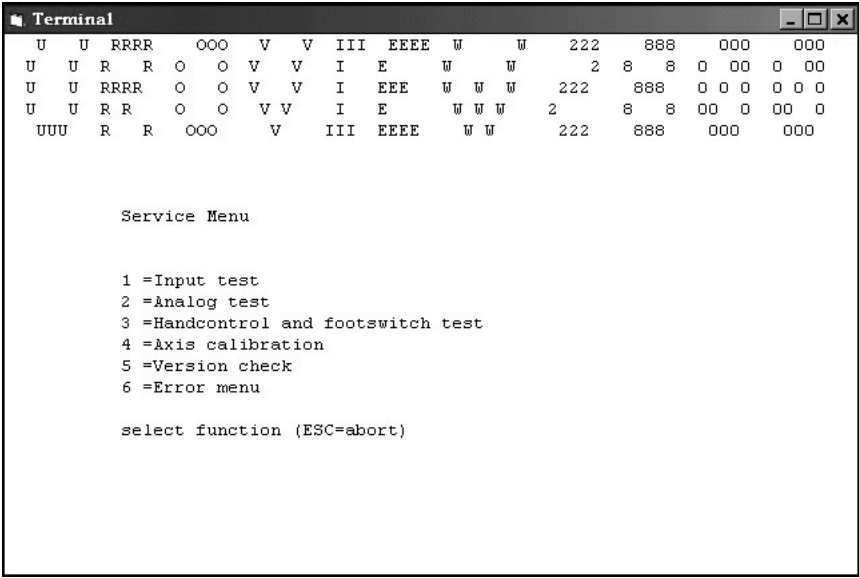
CAUTION: *Use care when changing values in the Parameter List. Incorrect values may cause the table to malfunction.*



Parameter List Window

14. Flip the Service switch to the *Service* position. The LED should stop blinking.
15. Click on the *Read CPU* button to load the established parameters from the table into the Parameter List window.
16. If the transfer was successful click *Ok*. If a Timeout Error message is displayed, check the serial cable connection and Service Switch status.
17. When the Firmware Information window displays, click on *Ok*.
18. Click on the Monitor button.
19. The Service Menu window will display.

Note: Refer to the Diagnostic section for information regarding tests other than Axis Calibration.



Service Menu

- 20. Select Axis Calibration by pressing 4 on your laptop with the Service Mode screen displayed.
- 21. The Calibration Menu will display.

Calibration

```
Terminal
U  U  RRRR  OOO  V  V  III  EEEE  W  W  222  888  000  000
U  U  R  R  O  O  V  V  I  E  W  W  2  8  8  0  00  0  00
U  U  RRRR  O  O  V  V  I  EEE  W  W  W  222  888  0  0  0  0  0  0
U  U  R  R  O  O  V  V  I  E  W  W  W  2  8  8  00  0  00  0
UUU  R  R  OOO  V  III  EEEE  W  W  222  888  000  000

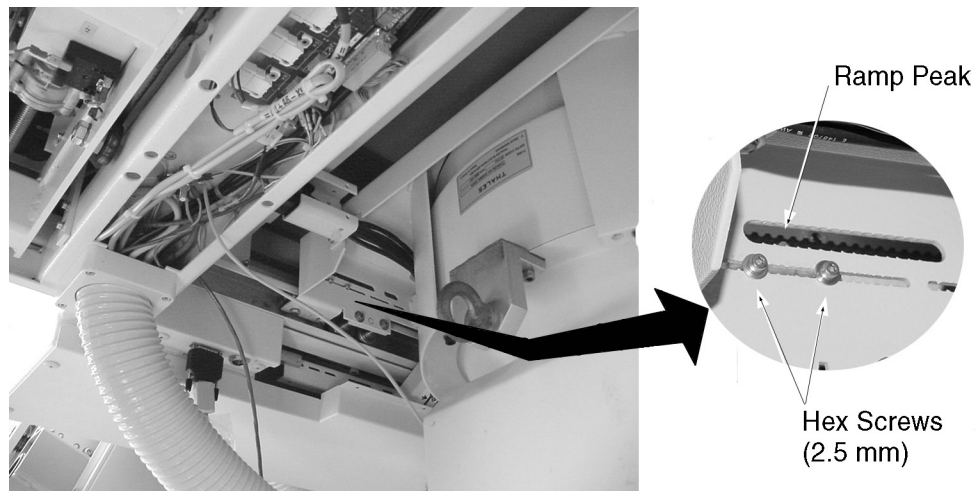
Calibration Menu

1 =vertical
2 =x-ray system
3 =tilt
4 =tabletop longitudinal
5 =cassette
6 =tabletop lateral
7 =Loadposition

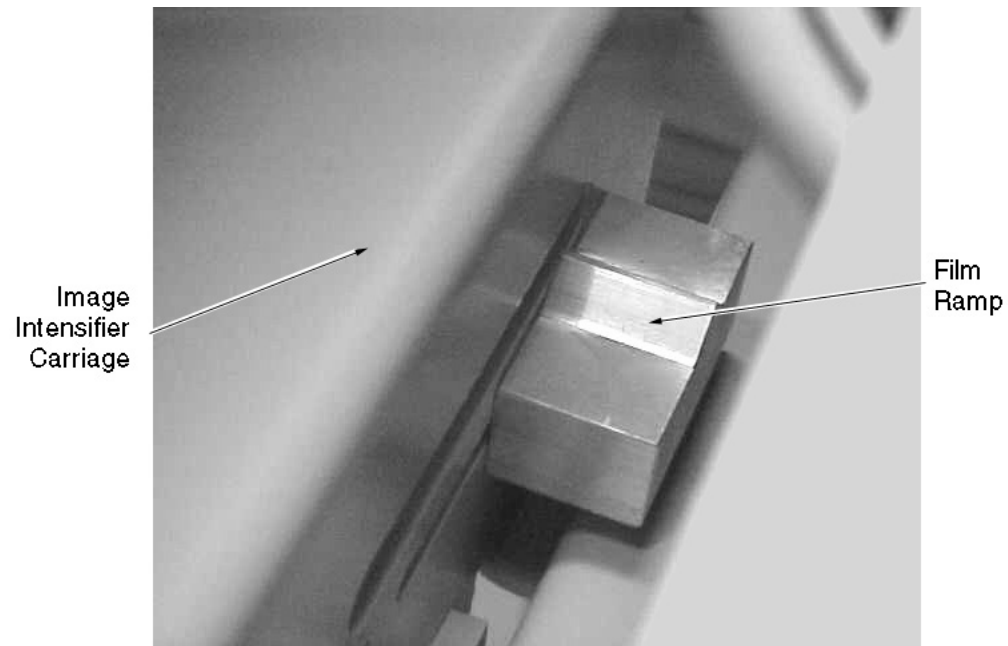
select function (ESC=abort)
```

Axis Calibration Window

22. Select X-ray System by pressing 2 on your laptop keyboard with the Calibration Menu displayed.
23. Insert an 11x17 film cassette in the Film Tray.
24. Press the MEM1 button on the Handcontrol to move the cassette to the foot-end of the table.
25. Use the X-ray System buttons on the Handcontrol, to position the X-ray Arm Asm until the peak of the ramp activates the microswitch.

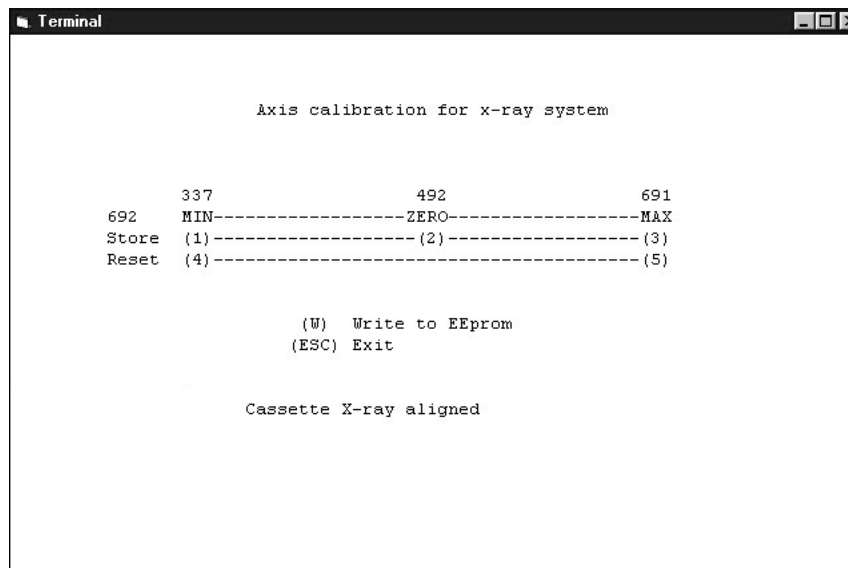


Bottom View of Table



Ramp Peak

26. With the X-ray System Axis Menu displayed, press 2 on the laptop to store the ZERO position of the Cassette.



```
Terminal

Axis calibration for x-ray system

337          492          691
692 MIN-----ZERO-----MAX
Store (1)----- (2)----- (3)
Reset (4)----- (5)

(W) Write to EEprom
(ESC) Exit

Cassette X-ray aligned
```

Axis Calibration for X-ray Arm Window

27. Press W to write the value to the EEPROM.
28. Place the Service Switch in the RUN position.
29. Reboot the system.
30. Place the system in film mode and set the technique to 50 kVp @ 30 mAs.
31. Collimate the leaves 5 cm (2 inches) smaller than the film cassette's limits.
32. Take a film exposure and process the film.
33. Fold the film in half, laterally, and measure the difference between the exposed edges relative to the center.
34. Loosen two allen screws and move the X-ray System Ramp by half the distance measured.
35. Return to the X-ray System Calibration menu and recalibrate the MIN, MAX and ZERO positions.

Calibration

36. Collimate and take an exposure.
37. Verify the image is centered in the film longitudinal direction within 0.45 inches (1% x 45" film SID). If not centered, reset the X-ray System Ramp until the exposure is within specification.
38. Verify lateral centering within 0.45 inches. Fold the film in half and determine the difference between the exposure edges relative to the center.
39. Take a final film shot with collimator leaves fully open. Verify all four edges of the X-ray beam can be seen on the film.

Camera Iris / Tracking Verification and Adjustment

1. Remove the alignment template if not already removed.
2. Write the model number, serial number and calibration due date of all required test equipment. If your DMM and/or Dosimeter have not been checked for function today, do it now.
3. Record the current station barometric pressure in mm Hg. (This step is not required for the Radcal 9015 dosimeter.)
4. Using a calibrated temperature probe, record the room temperature in °C. (This step is not required for the Radcal 9015 dosimeter.)
5. If using the Kiethley dosimeter enter the pressure and temperature values into the dosimeter.
6. Place two 1 mm copper filters on the bottom of the collimator.
7. Place the dosimeter paddle (Keithley or Radcal) in the center of the beam. Use the light to mark where the center is. Make sure the dosimeter is set up to measure R/min.
8. In auto mode take a fluoro exposure long enough to get a stable reading and verify that the dose is 4.4 mR/min $\pm$.05 mR/min and kV tracks to 70 kV $\pm$ 1 kV. Use a Bristol spline tool (.048 inch) to loosen and adjust the camera open iris stop so that when an exposure is taken it tracks correctly.
9. Adjust iris in the closed position: 17.0 mR/min $\pm$.05 mR/min.
10. Verify camera focus, using either the Nuclear Associates 07-523 converging line pair tool, or the Wisconsin mesh tool.

II Size	NORM 60/50 Hz	MAG1 60/50 Hz	MAG2 60/50 Hz
14-inch	≥ 2.0 LP/mm	≥ 2.1 LP/mm	≥ 2.4 LP/mm
16-inch	≥ 1.8 LP/mm	≥ 2.1 LP/mm	≥ 2.4 LP/mm

Auto Technique Tracking

WARNING: Steps within this procedure produce x-rays. Use appropriate precautions.

1. Select Auto Fluoro mode and the NORM field size
2. Verify that the kVp tracks accurately according to the following table, as copper filters are inserted into the field. Tape the filters to the Collimator – Do not lay them on the table.

Copper Filters	kVp range
1	61 kVp $\pm$ 3 kVp
2	71 kVp $\pm$ 3 kVp
3	79 kVp $\pm$ 3 kVp

Automatic Exposure Control

Automatic Exposure Control (AEC) calculates mAs for a desired Optical Density (OD) based on a set kVp and the dose measured in the table's ion chamber. AEC calibration should be performed at system installation, film/screen change and after ion chamber replacement.

AEC Calibration

It is necessary to complete a series of exposures. Once calibration is started, you cannot abort, without restarting the calibration from the beginning. The series of exposures performed is dependant upon your responses to the on-line prompts. Fifteen to forty film exposures may be required. Verify that the film development lab is accessible and functioning before beginning this procedure.

Obtain the target OD from the customer prior to entering calibration mode. The OD can be set from 0.9 thru 2.0. The default value is 1.2.

1. Verify the following special tools and equipment are available before proceeding.
 - Seven 5 x 30 x 30 cm (2 x 12 x 12 inch) Plexiglas sheets
 - Densitometer access
 - Film development equipment access
2. Perform a Beam Alignment Test to verify the imaging chain is aligned prior to performing AEC calibration.
3. Turn on the Collimator Lamp.
4. Place 20 cm of Plexiglas on the table-top, centered within the illuminated area.
3. Connect the Utility Suite cable to the laptop and the ARCNet port on the rear of the Workstation.
4. Start the Utility Suite software.
5. Click on the *VIEW* pull-down menu and select AEC.

Calibration

UtilitySuite - [AEC Calibration Form]

File View Tools Connect Help

AEC Views
AEC Calibration Form

Startup/Shutdown Calibration
Stop Calibration Target OD : 1.20 System Target OD : 0.00

Operational Values
kV mAs Plexiglas thickness (cm) Exposure Time
80 100.00 30 2000
AEC Ref : 0.55 Measured OD : 0

Instructions
Develop the film from the X-ray, measure the Optical Density and enter the value in the Measured OD input box. Enter zero (0) to redo the exposure.
Measured OD Done

Completed Steps in the Calibration

Step	kV	Vref0	mAs0	Plexiglas (cm)
1	80	0.33	3.70	15
2	40	0.35	14.20	5
3	60	0.37	5.50	10
4	100	0.31	3.50	20
5	125	0.28	3.60	25

Step	ExpoTime(ms)	Vref0	Plexiglas (cm)
1	500	1.20	30
2	1000	1.33	30
3			
4			
5			

AEC Calibration Form

- Click on the Connect pull-down menu and select SYSTEM.
- Enter the target OD (0.9 thru 2.0).
- Click on the *Start Calibration* button.
- Follow the on-line instructions to complete AEC calibration. You will be notified when the calibration is complete.

Note: Instructions are displayed within the instruction box on the AEC form. If a problem is encountered while developing a film, enter 0 for the "Measured OD" and say yes to repeat exposure.

Note: If calibration cannot be completed it may be possible to save the calibration data to an AEC Log File and reuse the saved data rather than starting at the beginning of the AEC Calibration. Read the section on saving an AEC Log File and Restarting an AEC Calibration from a Log File.

10. When the calibration is complete, reboot the system by cycling the power switch.
11. Verify AEC mode is selected and set the technique to 80 kVp @ 100 mAs.
12. Place 20 cm of Plexiglas in the beam and take a final exposure.
13. Develop the film and verify that the OD is within 10% of the desired OD.

Saving an AEC Calibration Log File

If the AEC Calibration was interrupted but the calibration data entered into the Utility Suite is valid, save the data to an AEC Log File on your hard-drive and then restart the calibration. See the section Restarting Calibration from an AEC Log File. To save data to a log file:

1. Click on the View pull-down menu and select *Show Log*.
2. Select the *AEC* tab in the log window.
3. Right click on the left most portion of the log window. A menu with *Save AEC Log* will appear.
4. Select *Save AEC Log* and save the file in a location of your choosing.

Restarting Calibration from an AEC Log File

This procedure may be used to restart an AEC Calibration that was interrupted due to:

- Loss of system power during the calibration.
- The connection between RUS and the system was disturbed during the calibration.
- The operator determined that the wrong amount of Plexiglas was used for a portion of the calibration.

Use the film cassette to take X-ray shots, but there is no need to develop the film until you get to the point that the calibration was interrupted. Use the same film screen initially used in the calibration.

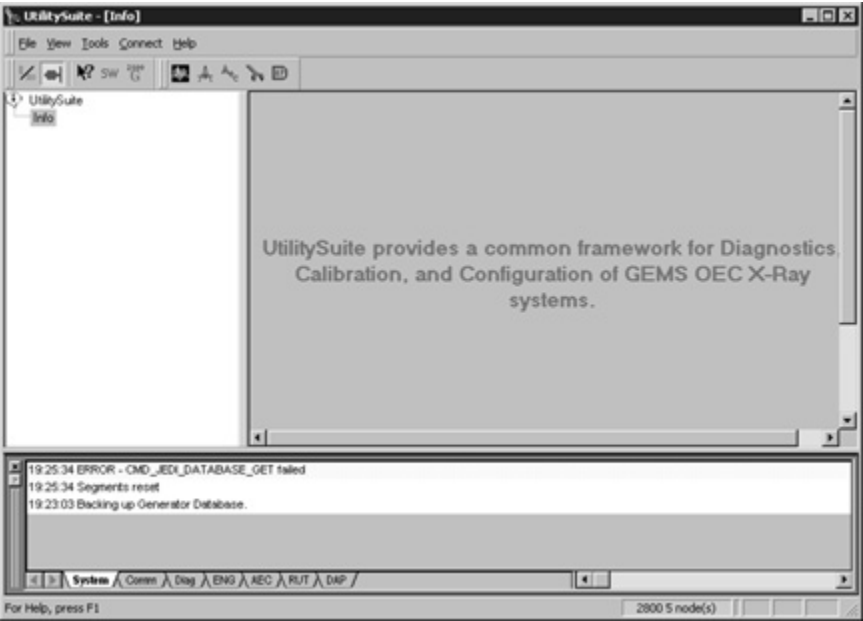
1. Open the saved AEC Log File using a text editor.
2. Start the AEC Calibration.

Calibration

3. After taking a film shot, check the AEC Reference value in the “Operational Values” portion of the screen and compare it to the number in the log file for the same technique. If the AEC Reference value is the same or within ± 0.02 then use the “Measured OD” value from the log file, else repeat the exposure and go to step 4. Repeat this step until you get to the last good technique in the log file. (The last good technique could be some where in the middle of the log file if you determined that you used the wrong amount of Plexiglas for a given technique).
4. Load new film into the film cassette before taking the film shot for the technique you are going to start from and continue with the calibration normally.

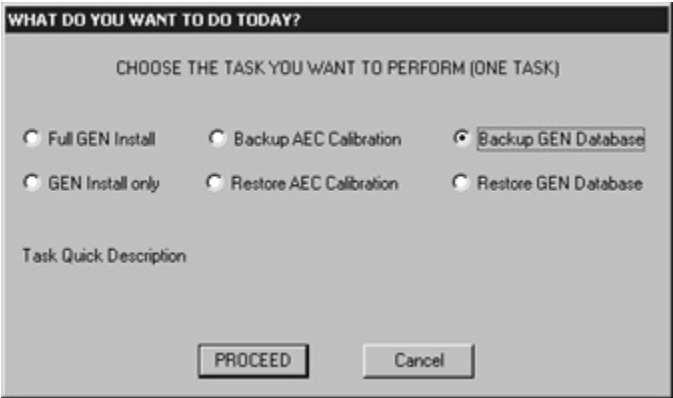
AEC Calibration/Database Software

1. Connect the Utility Suite cable to the laptop and the ARCNet port on the rear of the Workstation.
2. Start the Utility Suite software.
3. Click on the Connect pull-down menu and select SYSTEM.
4. Click on the 2800 G icon in the toolbar.



Utility Suite Main Screen

- 5. Select one of the following tasks. Each task is defined in the table.



Task Selection Wizard

Task Selection Wizard Descriptions	
Task	Description
Full GEN Install	Performs the following steps in sequence: 1. Backup the AEC Calibration data to a file on the hard-drive. 2. Backup the AEC Database to a file on the hard-drive. 3. Upgrades the generator software (boot.mx, app.mx, dbase.mx) 4. Restore the generator's AEC database. 5. Restore the generator's AEC Calibration data.
GEN Install Only	Upgrades the generator software (boot.mx, app.mx, dbase.mx) WARNING: This action deletes the AEC Calibration data and AEC Database. A manual AEC Calibration must be performed afterward to reestablish the data.

Task Selection Wizard Descriptions	
Task	Description
Backup AEC Calibration	Downloads the Calibration data contained in generator firmware to a Calibration file on your hard-drive. Hint: Name the file using the system ID.
Restore AEC Calibration	Copies the data in the Calibration file on your hard-drive to generator firmware.
Backup GEN Database	Copies the database from firmware in the generator to the dbase.mx file on the hard-drive.
Restore GEN Database	Copies the dbase.mx file data from the hard-drive to firmware in the generator.

6. Click the Proceed button and follow the on-line prompts to perform the desired task.

AEC mAs Repeatability

AEC provides control of optical density by controlling mAs. Each manual step from the 'N' setting causes a 12.5% ±5% positive or negative change in mAs..

If calculating the theoretical mAs at a particular station, the value will be:

$$N * (1.125^Y)$$

When calculating the acceptable step gradient tolerance, the equation will be:

$$SP = \left[\left[\left(\frac{Measured - Average}{N} \right)^{\frac{1}{Y}} \right] * 100 \right] - 100$$

N = the average nominal mAs value (mAs at the 'N' setting)

Y = the station number (integer values of -6 through +6)

Calibration

The result (SP) of the above equation will fall between 7.5% and 17.5%.

Note: The measured average and the 'Y' value must be at the same manual setting.

1. Set the technique to 72 kV @ 200 mAs.
2. Center 15 cm ($\cong$ 6-inches) of acrylic material in the X-ray beam so that it covers all three ion fields.
3. Place a dosimeter in the center of the acrylic material.
4. Take a series of five film shots with the right ion field enabled and calculate 'N' for the right ion field.
5. Take a series of five film shots with the center ion field enabled and calculate 'N' for the center ion field.
6. Take a series of five film shots with the left ion field enabled and calculate 'N' for the left ion field.
7. Verify that the left and right ion field N values are within 10% of the center ion field N value.
8. For each ion chamber perform the following:
 - A. Enable only the desired ion field.
 - B. Take a series of 3 film exposures at each manual setting (+6 thru -6).
 - C. Average the 3 shots taken for each manual setting.
 - D. Calculate SP for each manual setting and verify that the result is within specification ($7.5\% < SP < 17.5\%$).

Workstation Monitor Setup

Note: *All adjustments to the monitors and light sensor should be performed after the monitors have reached normal operating temperature. This generally requires one hour of time.*

Monitor Size Calibration

1. Connect the Utility Suite cable to the laptop and the back of the Workstation.
2. Open the Utility Suite software.
3. Click on the *View* pull-down menu and select *RUT*.
4. Click on the *Connect* pull-down menu and select *System*.
5. Click on the *File* pull-down menu and select: *Open, From System, Both* to load the data from the 2800.
6. Select *Monitor Calibration* from the directory tree.
7. Click on *Display Test Pattern* and select *Grey Scale*.
8. The pattern on the left monitor should measure 10 x 10-inches.
9. If the pattern sizing needs adjustment, use the Vertical and Horizontal sliders on the form to make the pattern measure 10 x 10-inches.
10. If the pattern centering needs adjustment, use the Vertical and Horizontal Position Sliders to center the pattern on the monitor.
11. Use the sliders on the form to size and center the right monitor.
12. From the *File* pull down menu select: *Save, To System, Workstation*.
13. Turn the system off, wait for about 10 seconds then turn the system back on.



Workstation Monitor Brightness/Contrast Calibration

1. Connect the Utility Suite cable to the laptop and the back of the Workstation.
2. Open the Utility Suite.
3. Click on the *VIEW* pull-down menu and select *RUT*.
4. Click on the *CONNECT* pull-down menu and select *SYSTEM*.
5. Click on the *FILE* pull-down menu and select: *OPEN, FROM SYSTEM, BOTH* to load the current data.
6. Select *Monitor Calibration* from the directory tree.
7. Click on *Display Test Pattern* and select *Grey Scale*.
8. Carefully, select the *Minimum Light Settings* by clicking on one of the minimum brightness or contrast sliders. Click on top of the pointer on the slider, (this will prevent you from inadvertently changing the setting when you select it). When a slider is selected it will have a red box around it allowing you to use the right and left arrows on the laptop keyboard to make fine adjustments.
9. Using a light meter verify that the black and white panels on the center of the monitor produce the following light levels:

Minimum Light Settings	
Black Panel light level	White Panel light level
0.70 to .085 Foot Lamberts	145 to 155 Foot Lamberts

10. Carefully select the *Maximum Light settings* by clicking on one of the maximum brightness or contrast sliders. Click on top of the pointer on the slider, (this will prevent you from inadvertently changing the setting when you select it)

11. Using a light meter, verify that the black and white panels on the center of the monitor produce the following light levels:

Maximum Light Settings	
Black Panel light level	White Panel light level
1.1 to 1.25 Foot Lamberts	195 to 205 Foot Lamberts

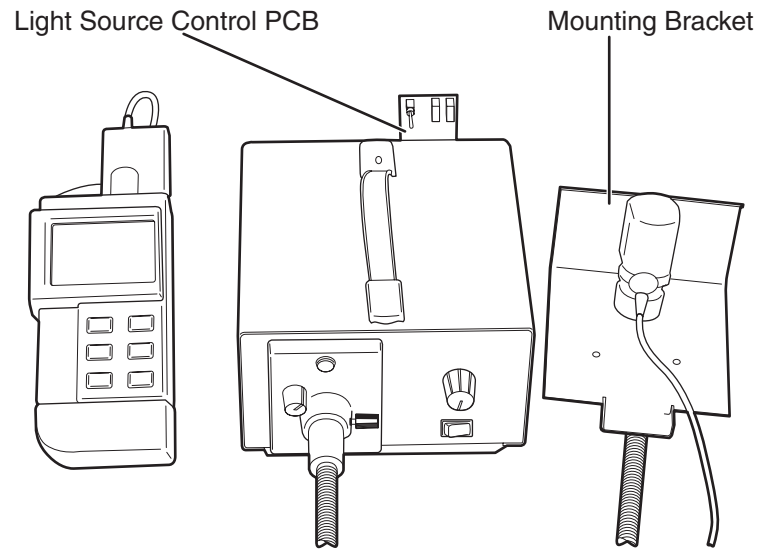
12. Click on the *Right* monitor tab to select the Right monitor.
13. Repeat the Minimum and Maximum light setting adjustment for the right monitor
14. Click on the *Calibrate Light Sensor* button.
15. Set for minimum light and click OK.
16. Set for maximum light and click OK.
17. Click on the *FILE* pull-down menu and select: *SAVE, TO SYSTEM, WORKSTATION*.
18. Turn the system off, wait for about 10 seconds then turn the system back on.

Light Source Calibration

The following equipment is required to calibrate and verify the light source.

- Light meter
- Fostec light source and head with mounting bracket.
- Fostec light source control PCB

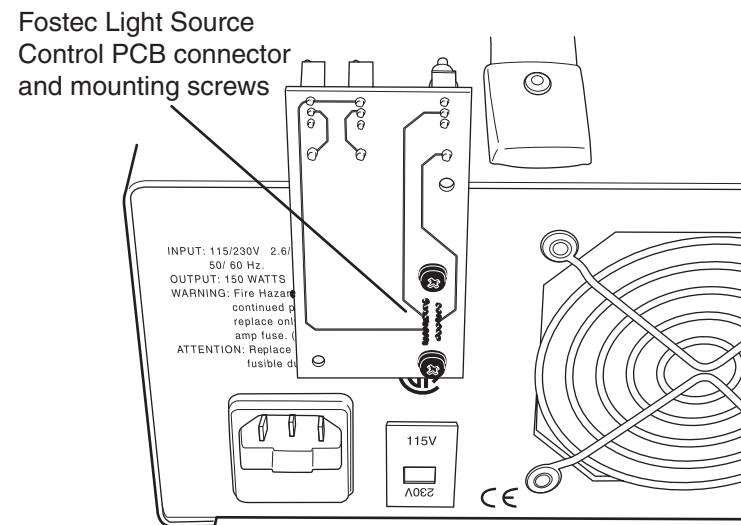
Light Source Setup



Light Source Verification

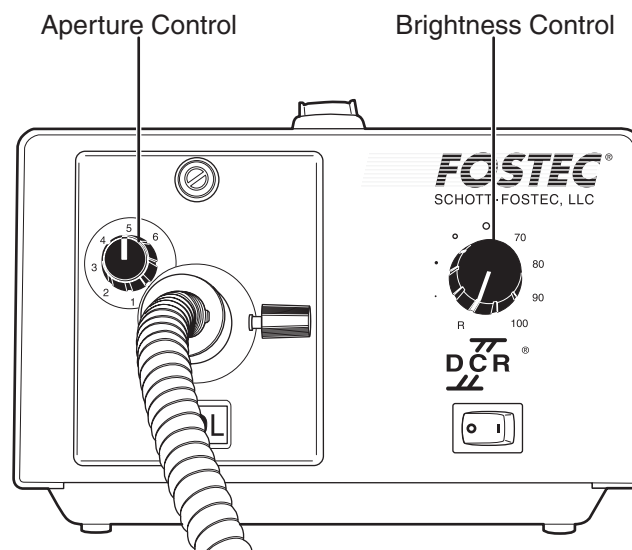
1. Mount the Fostec Light Source Control PCB onto the connector labeled NOT RS232 at the rear of the Fostec Light Source.
2. On the Fostec light source front panel, turn the aperture control to the number 5 position.

Calibration



3. Turn the brightness control knob to the remote (R) position, (CCW).

Calibration

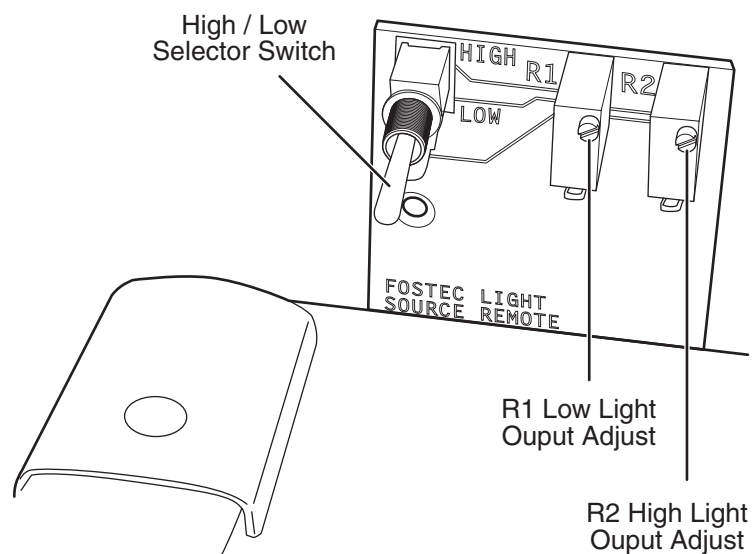


4. Attach the fiber optic cable to the light source.
5. Use the light meter to calibrate the output of the light source. Place the light meter sensor over the hole in the mounting bracket. (The light meter sensor must completely cover the hole in the bracket to prevent any additional light from leaking into the meter).
6. Turn on the Fostec Light Source and let it warm up for about 30 seconds.
7. Move the switch on the light source control PCB to the LOW position (down).
8. A reading of 1.7 Foot Lamberts ± 0.1 should be produced by the light source.
9. Move the switch on the light source control PCB to the HIGH position (down).
10. A reading of 21 Foot Lamberts ± 0.5 should be produced by the light source.
11. If both switch settings produce light levels that are too high or too low, adjust the aperture control knob slightly to correct the light output.

12. If both readings cannot be obtained from a single aperture setting when changing between the HIGH and LOW switch positions, the light source control board will need to be aligned.

Light Source Calibration

1. Move the switch on the light source control PCB to the LOW position (down).
2. Turn on the light source and let it stabilize for about 10 seconds.
3. Adjust R1 on the light source control PCB to obtain a reading of 1.7 Foot Lamberts ± 0.1 on the light meter.
4. Move the switch on the light source control PCB to the HIGH position (up) and let it stabilize for about 10 seconds.
5. Adjust R2 on the light source control PCB to obtain a reading of 21 Foot Lamberts ± 0.5 on the light meter.



Light Sensor Verification / Calibration

Note: All adjustments to the monitors and light sensor should be performed after the monitors have reached normal operating temperature. Generally, one hour is required.

The following equipment is required to calibrate and verify the light sensor.

- Light meter
- Fostec light source and head with mounting bracket.
- Fostec light source control PCB

Light Sensor Verification

1. Verify that the light source is producing the proper light output in the HIGH and LOW switch settings.
2. Place the light source holding bracket over the Workstation light sensor.
3. Turn the system on and let it boot completely.
4. Using the photometer, verify that the black and white areas on the left monitor are producing the following illumination levels.

Simulated Minimum Light Settings	
Black Panel light level	White Panel light level
0.70 to 0.85 Foot Lamberts	145 to 155 Foot Lamberts

Simulated Maximum Light Settings	
Black Panel light level	White Panel light level
1.10 to 1.25 Foot Lamberts	195 to 205 Foot Lamberts

Light Sensor Calibration

1. Verify that the Fostec Light Source is properly adjusted.
2. Place the light source holding bracket over the Workstation light sensor.
3. Connect the Utility Suite cable to the laptop and the back of the Workstation.
4. Click on the *VIEW* pull-down menu and select *RUT*
5. Click on the *CONNECT* pull-down menu and select *SYSTEM*.
6. Click on the *FILE* pull-down menu, and select: *OPEN, FROM SYSTEM, BOTH*.
7. Select the *Workstation Calibration* form.
8. Click on the *Calibrate Light Sensor* button at the bottom of the form and follow the instructions appearing on the laptop.
9. Click on the *FILE* pull-down menu, and select: *SAVE, TO SYSTEM, BOTH FILES*.
10. Turn the system off, wait for about 10 seconds then turn the system back on.
11. Perform the light sensor verification test.

NEC 1850X Flat Panel Display Setup

The following paragraphs describe the setup procedure for the NEC 1850x flat panel display. First use the VSC CALIBRATION form in RUT to set the Video Standards Converter (VSC) modules to their factory default values. Then use display patterns in the RUT MONITOR CALIBRATION form along with the monitor's front panel controls to adjust the flat panel display.

Setting the VSC Modules to Factory Default Values

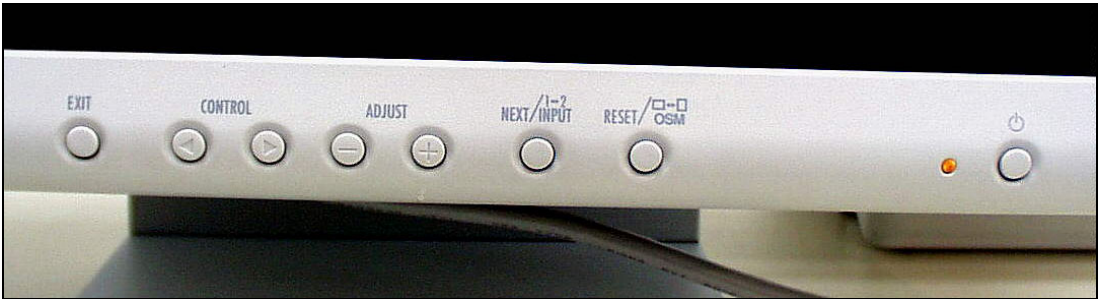
1. Connect the Utility Suite Cable between the laptop's serial port and the ARCNet port on the rear of the Workstation.
2. Turn on the Uroview system and the laptop, allowing both to boot completely.
3. Start the Utilities Suite software on the laptop and select USER LEVEL 2.
4. Select SYSTEM under the CONNECT menu and wait until the laptop and Uroview begin communicating. (This is indicated by a green mode bar in the lower left corner of the laptop's screen.)
5. Select RUT OPTIONS from the TOOLS menu.
6. Select 2800 as the default product type, and click OK.
7. Select RUT from the VIEW menu, and click YES when the program asks if you want to update settings. This takes a few seconds.
8. From the RUT menu on the left, select VSC CALIBRATION FORM.
9. Select SETTINGS for each installed module (normally only one), and select DETECT and RESET CHANNEL SETTINGS TO FACTORY DEFAULTS for both A and B channels.
10. Click OK on the VSC CALIBRATION FORM. This sets the VSC modules to their factory default values, and sets the VSC to detect the active video channel automatically.

Setting Up the Flat Panel Display

Familiarize yourself with the FPD front panel controls, and then use them along with RUT to set up the Flat Panel display.

How to Use the FPD Controls

The following illustration shows the NEC 1850X Flat Panel Display's front panel controls. There are seven control buttons plus the On/Off pushbutton. The LED next to the On/Off button glows yellow when there is no valid signal present on either monitor input, or green when a valid input signal is present.



NEC 1850x front Panel Controls

The NEC 1850X has a built-in, on-screen menu system you access through the front panel controls. The menu system is called the On-Screen Manager, and is abbreviated herein and in NEC documentation as OSM.

The front panel controls access and manipulate the OSM as described in the following table:

NEC 1850X Front Panel Controls	
Control	Function
EXIT	Takes you back to the previous menu, or, in some cases, gets you out of the OSM menu altogether.
CONTROL < / >	Moves highlight left or right to select a control menu. Moves the highlight up or down to select a submenu

Calibration

ADJUST + / -	Moves selected control left or right to decrease or increase selected parameter. Active Auto Adjust function. Press to enter a submenu.
NEXT	Moves the highlighted area of the Main menu right to select one of the controls.
RESET	Resets the highlighted control menu to the factory setting.

Note: To access the OSM menu, press any of the control buttons (<, >, -, or +). To rotate the OSM between landscape and portrait modes, press the RESET button. OSM must be closed (not on the screen) to rotate OSM.

FPD Setup Procedure

Use the Flat Panel Display's front panel controls along with RUT to set up the Flat Panel Display for use.

Brightness Setting

Adjust the BRIGHTNESS setting all the way to the right (+).

Contrast Setting

1. From the RUT menu, select MONITOR CALIBRATION.
2. From the Display Test Pattern scroll down box, select GRAY SCALES.
3. Press the PICTURE SWAP foot pedal until the GRAY SCALES pattern image appears on the FPD.
4. Adjust the CONTRAST setting from - to + until just before the second white vertical bar in the gray scale pattern disappears. (Adjust until it disappears, and then back of (-) a little until it reappears).

Note: Make sure you can still see the second to the last black vertical bar.

Horizontal Size (H SIZE)

1. Display the MONITOR/CAMERA ALIGNMENT test pattern from the MONITOR CALIBRATION selection in RUT.
2. Press - or + until the circle appears round, and the boxes appear square.
3. Display the RANDOM test pattern from the MONITOR CALIBRATION selection in RUT. Make slight adjustments to Horizontal Size until all vertical bar patterns are gone. This may have to be an iterative adjustment.

Horizontal Position (LEFT/RIGHT)

Press - or + until the image centers horizontally.

Vertical Position (UP/DOWN)

Press - or + until the image is centered vertically.

Horizontal Fine Adjustment (FINE)

1. Display the MULTIBURST test pattern from the MONITOR CALIBRATION selection in RUT.
2. Press + or - until the noise in the right hand burst is minimized.

Color Setup (RGB)

Select the NATIVE color setup. With this setup, only the HUE can be adjusted through RUT. Adjustment to individual colors can be made on the FPD if required, but setups 1,2,3, or 5 must be selected to do this. NATIVE is the factory setup.

If individual color adjustments need to be made (not recommended), select 1,2,3, or 5, whichever most closely approaches the color scheme desired.

Press + or - to access the color adjustment menu. The following can be adjusted in this menu by pressing < or > to access the color, and then + or - to adjust it.

T - adjusts the "coolness" or temperature of the overall image. Adjustments made here are the most dramatic.

Calibration

R - adjusts the level of red in the image.

Y - adjusts the level of yellow in the image.

G - adjusts the level of green in the image.

C - adjusts the level of cyan in the image.

B - adjusts the level of blue in the image.

M - adjusts the level of magenta in the image.

S - adjusts the level of saturation or color intensity in the overall image. Decreasing saturation adds more white to the color, making a true red look pink for instance.

First Tool Box Adjustments

Smoothing

1. Press + to enter the SMOOTHING menu.
2. Press < or > until NORMAL is selected.
3. Press the EXIT button on the FPD.

Expansion Mode

1. Press + or - to enter the EXPANSION MODE setup.
2. Press < or > until FULL is selected.
3. Press the EXIT button on the FPD.

Video Detect

1. Press + or - to enter the VIDEO DETECT setup.
2. Press < or > until FIRST is selected.

Calibration

3. Press the EXIT button on the FPD.

DVI Selection

1. Press + or - to enter the DVI SELECTION setup.
2. Press < or > until DIGITAL is selected.
3. Press the EXIT button on the FPD.

Second Tool Box Adjustments

Language

1. Press + or - to enter the LANGUAGE setup.
2. Press < or > to select the language you want displayed while using the OSM.
3. Press the EXIT button on the FPD.

OSM Position

1. Press + or - to adjust the position of the OSM.
2. Press < or > to scroll between UP/DOWN and RIGHT/LEFT.
3. Press the EXIT button on the FPD.

OSM Turn Off

1. Press + or - to enter the OSM TURN OFF menu.
2. Press < or > to scroll through the time that the OSM will remain on the screen in seconds.
3. Press the EXIT button on the FPD.

OSM Lockout

The OSM can be locked out, i.e. no FPD adjustments can be made, by first pressing + or - to enter the OSM LOCKOUT menu, and then pressing < and then > and holding both down simultaneously to lock out OSM adjustments. Press EXIT to exit the menu. The next time +, -, <, or > is pressed, the OSM message "OSM LOCK OUT. SEE USER'S MANUAL FOR MORE INFORMATION" will appear. The OSM can be activated again by pressing < and then > and holding both down simultaneously while the message is being displayed. It is recommended that once the FPD has been setup, the OSM be locked out.

Resolution Notifier

1. Press + or - to enter the RESOLUTION NOTIFIER menu.
2. Press < or > until OFF is selected.
3. Press the EXIT button on the FPD.

Factory Preset

CAUTION: *Selecting FACTORY PRESET resets ALL parameters you have just set up*

Press + or - to enter the FACTORY PRESET menu. Pressing the RESET button on the FPD resets everything you have set up so far back to the original factory settings. DO NOT PRESS RESET WHILE IN THIS MENU. Press the EXIT button on the FPD twice to exit the OSM.

Lock out the OSM as described above if desired.

NEC 1880SX Flat Panel Display Setup

The following paragraphs describe the setup procedure for the NEC 1880SX flat panel display. First use the VSC CALIBRATION form in RUT to set the Video Standards Converter (VSC) modules to their factory default values. Then use display patterns in the RUT MONITOR CALIBRATION form along with the monitor's front panel controls to adjust the flat panel display.

Setting the VSC Modules to Factory Default Values

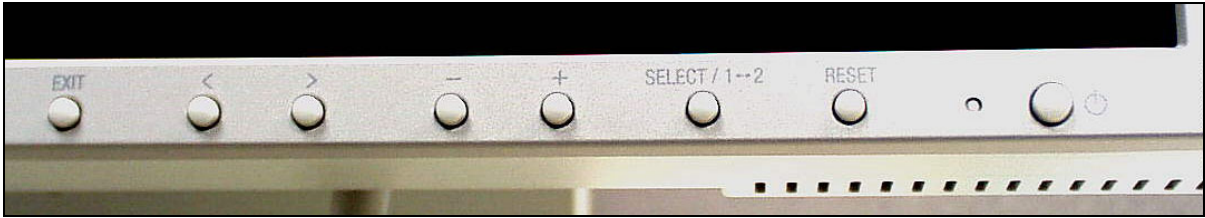
1. Connect the Utility Suite Cable between the laptop's serial port and the ARCNet port on the rear of the Workstation.
2. Turn on the Uroview system and the laptop, allowing both to boot completely.
3. Start the Utilities Suite software on the laptop and select USER LEVEL 2.
4. Select SYSTEM under the CONNECT menu and wait until the laptop and Uroview begin communicating. (This is indicated by a green mode bar in the lower left corner of the laptop's screen.
5. Select RUT OPTIONS from the TOOLS menu.
6. Select 2800 as the default product type, and click OK.
7. Select RUT from the VIEW menu, and click YES when the program asks if you want to update settings. This takes a few seconds.
8. From the RUT menu on the left, select VSC CALIBRATION FORM.
9. Select SETTINGS for each installed module (normally only one), and select DETECT and RESET CHANNEL SETTINGS TO FACTORY DEFAULTS for both A and B channels.
10. Click OK on the VSC CALIBRATION FORM. This sets the VSC modules to their factory default values, and sets the VSC to detect the active video channel automatically.

Setting Up the Flat Panel Display

Familiarize yourself with the FPD front panel controls, and then use them along with RUT to set up the Flat Panel display.

How to Use the FPD Controls

The following illustration shows the NEC 1880SX Flat Panel Display's front panel controls. There are seven control buttons plus the On/Off pushbutton. The LED next to the On/Off button glows yellow when there is no valid signal present on either monitor input, or green when a valid input signal is present.



NEC 1880SX Front Panel Controls

The NEC 1880SX has a built-in, on-screen menu system you access through the front panel controls. The menu system is called the On-Screen Manager, and is abbreviated herein and in NEC documentation as OSM.

The front panel controls access and manipulate the OSM as described in the following table:

NEC 1880X Front Panel Controls	
Control	Function
EXIT	Press to enter the OSM. Press again to enable submenus. Press to exit from a submenu. Press once or twice to exit the OSM.

Calibration

< and >	Selects brightness and contrast adjustment options on Main menu. Moves highlight between submenu tabs when submenu selection is active. Moves highlight between choices within an active submenu.
+ and -	Use to set bargraph adjustments like BRIGHTNESS.
SELECT/ 1<->2	Press to activate selected submenu. For example, after you highlight the RGB tab, press SELECT to enable the RGB submenu. Selects monitor's video source when the OSM is off.
RESET	Resets the highlighted control menu to the factory setting.

Note: To access the OSM menu, press EXIT, <, >, -, or +.

FPD Setup Procedure

Use the Flat Panel Display's front panel controls along with RUT to set up the Flat Panel Display for use.

Brightness Setting

1. Press EXIT button.
2. Press the + button to set the BRIGHTNESS bar all the way to the right (+).
3. Press EXIT button twice to leave the OSM and save your settings.

Contrast Setting

1. From the RUT menu, select MONITOR CALIBRATION.
2. From the Display Test Pattern scroll down box, select GRAY SCALES.
3. Press the PICTURE SWAP foot pedal until the GRAY SCALES pattern image appears on the FPD.
4. Press the EXIT button on the FPD. Press the > button to highlight the contrast button. This makes the CONTRAST adjustment bar appear.

Calibration

5. Use the + and - buttons on the FPD to adjust the CONTRAST setting to the point just before the second white vertical bar in the gray scale pattern disappears. (Adjust until it disappears, and then back of (-) a little until it reappears).

Note: Make sure you can still see the second to the last black vertical bar.

6. Press the EXIT button twice to leave the OSM and save your settings.

Horizontal Size (H SIZE)

1. Display the MONITOR/CAMERA ALIGNMENT test pattern from the MONITOR CALIBRATION selection in RUT.
2. Press the EXIT button on the FPD twice.
3. Press the > button on the FPD twice to highlight the Position Controls tab.
4. Press the SELECT / 1<->2 button on the FPD to select the Position Controls tab, turning the tab yellow.
5. Press the > button twice to highlight the Horizontal Size icon.
6. Press - or + until the vertical and horizontal differences from center are approximately equal.
7. Display the RANDOM test pattern from the MONITOR CALIBRATION selection in RUT. Make slight adjustments to Horizontal Size until all vertical bar patterns are gone. This may have to be an iterative adjustment.
8. Press the EXIT button twice to leave the OSM and save your settings.

Horizontal Position (LEFT/RIGHT)

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD twice to highlight the Position Controls tab.
3. Press the SELECT / 1<->2 button on the FPD to select the Position Controls tab, turning the tab yellow.
4. Press - or + until the image centers horizontally.
5. Press the EXIT button twice to leave the OSM and save your settings.

Vertical Position (UP/DOWN)

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD twice to highlight the Position Controls tab.
3. Press the SELECT / 1<->2 button on the FPD to select the Position Controls tab, turning the tab yellow.
4. Press the > button once to select the Vertical Position icon.
5. Use the - and + buttons to center the image vertically.
6. Press the EXIT button twice to leave the OSM and save your settings.

Horizontal Fine Adjustment (FINE)

1. Display the MULTIBURST test pattern from the MONITOR CALIBRATION selection in RUT.
2. Press the EXIT button on the FPD twice.
3. Press the > button on the FPD twice to highlight the Position Controls tab.
4. Press the SELECT / 1<->2 button on the FPD to select the Position Controls tab, turning the tab yellow.
5. Press the > button on the FPD three times to select the Horizontal Fine Adjustment icon.
6. Press + or - buttons to minimize the noise in the right-hand burst.
7. Press the EXIT button twice to leave the OSM and save your settings.

Auto Fine Adjustment

This function automatically and periodically adjusts the Horizontal FINE setting for a change in signal condition. It checks the signal every 33 seconds and makes adjustments if necessary. To turn this function on, do the following:

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD twice to highlight the Position Controls tab.
3. Press the SELECT / 1<->2 button on the FPD to select the Position Controls tab, turning the tab yellow.

Calibration

4. Press the > button on the FPD four times to select the Auto Fine icon.
5. Press the + or - button to turn Auto Fine on or off.
6. Press the EXIT button twice to leave the OSM and save your settings.

Color Setup (RGB)

Use the color presets in this menu to select the FPD's color temperature

Select the #2 color setup and adjust its temperature as follows:

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD three times to highlight the RGB tab.
3. Press the SELECT / 1<->2 button on the FPD to select the RGB tab, turning the tab yellow.
4. Press the > button the number of times necessary to select the #2 color temperature.
5. Press the + or - buttons to select a color temperature of 6200K.
6. Press the EXIT button twice to leave the OSM and save your settings.

First Tool Box Adjustments

Sharpness

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD four times to highlight the first toolbox icon.
3. Press the SELECT / 1<->2 button to choose the first toolbox icon, turning the tab yellow. The Sharpness tool should be highlighted.
4. Press the SELECT / 1<-> button again to activate the Sharpness icon.
5. Use the - and + buttons to adjust the image for maximum sharpness.
6. Press the EXIT button three times to leave the OSM and save your settings.

Expansion Mode

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD four times to highlight the first toolbox icon.
3. Press the SELECT / 1<->2 button to choose the first toolbox icon, turning the tab yellow.
4. Press the > button once to highlight the Expansion mode icon (the magnifying glass).
5. Press the SELECT / 1<->2 to choose the Expansion mode icon.
6. If necessary, press the > button until you highlight the word FULL.
7. Press the EXIT button three times to leave the OSM and save your settings.

Video Detect

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD four times to highlight the first toolbox icon.
3. Press the SELECT / 1<->2 button to choose the first toolbox icon, turning the tab yellow.
4. Press the > button twice to highlight the Video Detect icon.
5. Press the SELECT / 1<-> button to choose the Video Detect icon.
6. If necessary, press the > button until you highlight the words FIRST DETECT.
7. Press the EXIT button three times to leave the OSM and save your settings.

DVI Selection

Use this function to configure input 1 on the FPD as digital or analog. Since the Video Standards Converter supplies a digital signal to the FPD on input 1, you should select DIGITAL for this input.

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD four times to highlight the first toolbox icon.

Calibration

3. Press the SELECT / 1<->2 button to choose the first toolbox icon, turning the tab yellow.
4. Press the > button three times to highlight the DVI Selection icon.
5. Press the SELECT / 1<->2 button to choose the DVI Selection icon.
6. If necessary, press the > button until the word DIGITAL highlights.
7. Press the EXIT button three times to leave the OSM and save your settings.

Off Timer

This function turns the monitor off after a set period of time, whether or not the monitor is in use. You should probably leave this timer turned off.

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD four times to highlight the first toolbox icon.
3. Press the SELECT / 1<->2 button to choose the first toolbox icon, turning the tab yellow.
4. Press the > button four times to highlight the Off Timer icon.
5. Press the SELECT / 1<->2 button to activate the Off Timer icon.
6. Press the > button until the word OFF highlights.
7. Press the EXIT button three times to leave the OSM and save your settings.

Second Tool Box Adjustments

Language

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD five times to highlight the second toolbox icon.
3. Press the SELECT / 1<->2 button to choose the second toolbox icon, turning the tab yellow.
4. Press the SELECT / 1<->2 button to choose the Language icon.

Calibration

5. Press the > button until the language you prefer highlights.
6. Press the EXIT button three times to leave the OSM and save your settings.

OSM Position

Use this feature to specify where on the FPD screen you'd like the OSM (on-screen menu) to display.

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD five times to highlight the second toolbox icon.
3. Press the SELECT / 1<->2 button to choose the second toolbox icon, turning the tab yellow.
4. Press the > button once to highlight the OSM Position icon.
5. Press the SELECT / 1<->2 button to activate the OSM Position icon.
6. Press the > button to highlight LEFT/RIGHT. Then press the - or + button to place the OSM box in the horizontal position you want.
7. Press the > button to highlight DOWN/UP. Then press the - or + button to place the OSM box in the vertical position you want.
8. Press the EXIT button three times to leave the OSM and save your settings.

OSM Turn Off

This feature determines how long the OSM remains displayed on the FPD after its last use. You can adjust the time from 10 to 120 seconds.

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD five times to highlight the second toolbox icon.
3. Press the SELECT / 1<->2 button to choose the second toolbox icon, turning the tab yellow.
4. Press the > button twice to highlight the OSM Turn Off icon.
5. Press the SELECT / 1<->2 button to activate the OSM Turn Off icon.

Calibration

6. Press the > button to scroll to the time you want.
7. Press the EXIT button three times to leave the OSM and save your settings.

OSM Lockout

Use this feature to lock the OSM so an unauthorized person can't view it and change the FPD setup you are now doing. When somebody tries to enter the OSM when it is locked, the following message appears:

OSM LOCK OUT
SEE USER'S MANUAL FOR
MORE INFORMATION

To lock the OSM, hold down the SELECT / 1<->2 and + FPD buttons together.

To unlock the OSM, hold down the SELECT / 1<->2 and + buttons together.

OSM Rotation

Use this feature to rotate the OSM box for convenient viewing on a portrait-oriented or landscape-oriented FPD screen. Follow these steps:

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD five times to highlight the second toolbox icon.
3. Press the SELECT / 1<->2 button to choose the second toolbox icon, turning the tab yellow.
4. Press the > button four times to highlight the OSM Rotation icon.
5. Press the + or - button to rotate the OSM box to portrait or landscape mode.
6. Press the EXIT button two times to leave the OSM and save your settings.

Resolution Notifier

This message appears when the FPD is not being used at its optimal resolution of 1280 x 1024 pixels. If you have already set the Expansion Mode to FULL (1280 x 1024 pixels), this won't happen. You should turn off this feature to avoid customer problems. Here's how:

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD five times to highlight the second toolbox icon.
3. Press the SELECT / 1<->2 button to choose the second toolbox icon, turning the tab yellow.
4. Press the > button five times to highlight the Resolution Notifier icon.
5. Press the SELECT / 1<->2 button to activate the Resolution Notifier tool.
6. If necessary, press the > button to highlight the word OFF.
7. Press the EXIT button three times to leave the OSM and save your settings.

Hot Key

This feature turns the <, >, + and - FPD buttons into hot keys you can use at any time to adjust the FPD's contrast and brightness without going through a menu.

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD five times to highlight the second toolbox icon.
3. Press the SELECT / 1<->2 button to choose the second toolbox icon, turning the tab yellow.
4. Press the > button six times to highlight the Hot Key icon.
5. Press the + button to turn the Hot Key option on. Press the - button to turn the Hot Key option off.
6. Press the EXIT button two times to exit the OSM and save the Hot Key setting.

With the Hot Key option enabled, press < or > to adjust the FPD's brightness. Press - or + to adjust the FPD's contrast. Press the EXIT button once to make the OSM box go away.

Factory Preset

This feature allows you to reset all OSM control settings to factory defaults. You can also reset individual settings by highlighting the appropriate control and pressing the FPD RESET button.

CAUTION: *Selecting FACTORY PRESET resets ALL parameters you have just set up*

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD five times to highlight the second toolbox icon.
3. Press the SELECT / 1<->2 button to choose the second toolbox icon, turning the tab yellow.
4. Press the > button seven times to highlight the Factory Preset icon.
5. Press the SELECT / 1<->2 button to activate the Factory Preset tool.
6. The FPD displays a message that a reset affects all settings.
7. If you are truly interested in a total reset of the FPD, simply press the FPD's RESET button.
8. Press the EXIT button three times to abort the global reset and leave the OSM.

Information Features

Use these features to find technical and identifying information about the Flat Panel Display.

DISPLAY MODE

This feature provides information about current display resolution. It also provides information on preset timing, horizontal frequency, and vertical frequency. Do the following to view these data:

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD six times to highlight the Information icon.
3. Press the SELECT / 1<->2 button to choose the Information icon, turning on its yellow tab.

Calibration

4. Press the > button to highlight the MODE icon.
5. Press the SELECT / 1<->2 button to view MODE information.
6. Press EXIT three times to close the OSM box.

MONITOR INFORMATION

This feature provides model and serial numbers for the FPD. Do the following to view these data:

1. Press the EXIT button on the FPD twice.
2. Press the > button on the FPD six times to highlight the Information icon.
3. Press the SELECT / 1<->2 button to choose the Information icon, turning on its yellow tab.
4. Press the > button to highlight the Monitor icon.
5. Press the SELECT / 1<->2 button to view Monitor information.
6. Press EXIT three times to close the OSM box.